PreSens
PRECISION SENSING

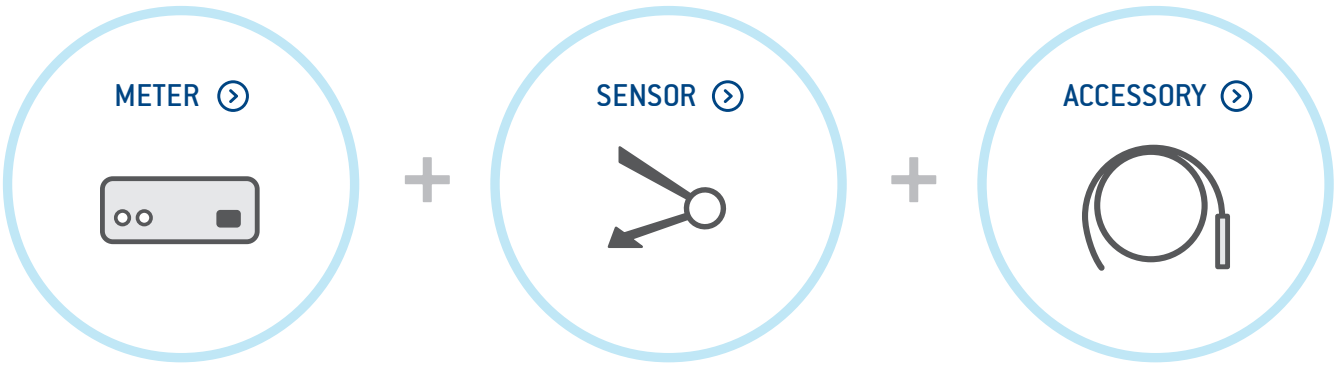
Optical Oxygen Sensors & Meters

- Variety of sensors for industrial and scientific applications
- µL up to m^3 range
- Pre-calibrated
- Insertion in plant and animal tissue
- For microbial and cell culture

www.PreSens.de/o2

Content

Functional Principle



We bring to light what‘s inside...

Products Made in Germany

PreSens offers a broad range of sensor systems for end users in Bioprocess Control, Biological & Environmental Research, the Food & Beverage industry as well as other industrial applications.

We offer systems for

- Oxygen measurement in gases and liquids
- Non-invasive online pH, CO_2 and oxygen measurement
- Oxygen and pH sensors for single-use bioreactors
- Microsensors pH, oxygen and CO_2
- Process control in shake flasks incl. biomass monitoring
- Low-maintenance DO measurement for fermentation and bioreactor systems
- Online oxygen and pH measurement in disposables like multiwell plates and plastic bags
- Imaging solutions for 2D-mapping of oxygen-, pH-, and CO_2-distribution

Our product range is constantly expanding.

Company Profile

Based on research activities in the 1980‘s at the University of Regensburg, Germany, PreSens Precision Sensing GmbH was founded in 1997.

The company combines long-time experiences of different researchers in the fields of electronic engineering and sensor development. Right from the beginning, microsensor systems were sold to customers in life sciences. Already in its first decade of operation PreSens became one of the leading companies in the field of chemical optical sensor technology. Together with its partners it offers full service in Europe, America and Asia.

Service

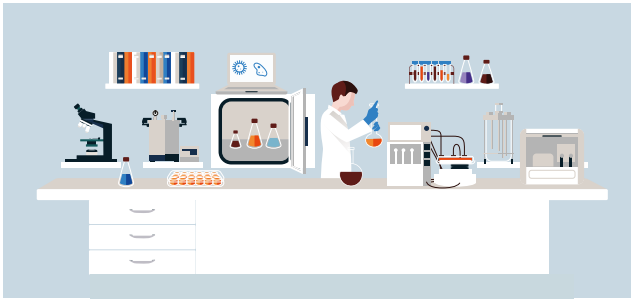
Furthermore, we are developers and manufacturers of opto-electronic OEM sensor components for companies in the field of medical equipment and process control.

DEKRA Certification DEKRA certified

Quality Management
ISO 9001
ISO 13485
Voluntary participation in regular monitoring

Is your application missing? Contact us and we find your customized solution!

...and work for the following industries.



Biotech & Pharma

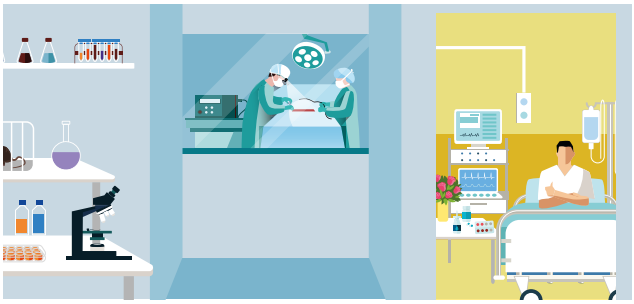
Our Biotech & Pharma business field helps pharmaceutical companies such as Roche and DSM to improve their bioprocess development with PreSens sensors. With two decades of customer feedback our product development provides efficient solutions for your needs.

Food & Beverage

A cooperation with the market leader for beverage filling systems, Krones AG, Neutraubling, triggered our Food & Beverage business field in the late 1990's. PreSens supplies sensors for checking the oxygen-tightness of packaging and special systems for determining the penetrability of oxygen in PET bottles at companies such as Nestlé, Heineken or Danisco.

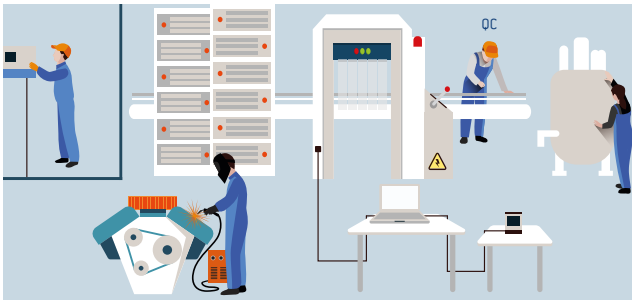
Biology & Environmental

Our worldwide customer base in biological & environmental research has now grown to hundreds of users coming from the University of Alaska in Anchorage to the University of Wellington in New Zealand. For more than two decades we have delivered special sensor systems for various applications such as respirometry, or environmental monitoring.



Medical Research & Life Sciences

Our most recent business field arose from a cooperation with renowned medical technology manufacturers from the medical devices sector. PreSens supplies OEM parts, which are integrated into more complex medical systems. Microsensors, sensor spots, and imaging systems are applied in tissue engineering, microfluidics, and many other medical research fields.



Industry & Technical Applications

Robust probes with excellent long-term stability or sensors for contactless measurement find use in technical or industrial applications. Specially designed flow-through connectors for integration in pipes are already applied to monitor the oxygen content in liquids or gases. OEM sensor components can be designed to be integrated in customer systems.

METERS

Oxygen Meters

Single- and Multi-channel Devices for Precise Oxygen Measurements

PreSens has the perfect oxygen meters for any application. They can be combined with oxygen microsensors, spots, flow-through cells or dipping probes with stainless steel housing. The portable or wall mount systems with display have immense storage capacity for prolonged computer independent use. Our small, benchtop oxygen meters – available as single or multi-channel devices - are PC controlled with the PreSens Measurement Studio 2 software. This software allows to control multiple meters simultaneously.
The trace oxygen meters offer a measurement range from 1 ppb up to 100 % oxygen. Due to the fiber optic measurement principle they can even be used for measurements in hazardous areas. Here you will find the ideal oxygen meter for your needs!

- For use with microsensors, non-invasive spots, flow-through cells & robust dipping probes
- Trace meters measure from 1 ppb up to 100 % oxygen
- Portable devices with long-lasting batteries and large storage capacity
- Wall mount meters with display and analog output
- USB-powered, small benchtop meters
- PreSens Measurement Studio 2 software for simultaneous control of multiple meters

Is your application missing? Contact us and we find your customized solution!

Examples for Applications

Environmental & Biological Research

The handheld Microx 4 & Fibox 4 devices are ideal tools for field reasearch, and can be applied for gaseous or dissolved oxygen measurements. Combined with different types of dipping probes, or oxygen microsensors they allow e. g. water quality assessment, respiration measurements, or measurements inside tissue. These oxygen meters are applicable wherever precise oxygen measurement is needed. With their splash proof, robust housing the oxygen meters can be used in harsh environments. Special energy settings for long term measurements, the almost unlimited storage capacity or features like graphical display of your measurements allow for prolonged and comfortable computer-independent use.

Meters for Medical Research & Life Sciences

OXY-1 SMA & ST devices can easily be set up and operated via software while requiring minimum space. The software offers numerous functions for visualization and analysis of your online oxygen measurements. Combined with oxgyen microsensors the OXY-1 ST (trace) can for example be applied to measure profiles in smallest sample volumes or in tissue constructs. PreSens oxygen sensors are already applied in numerous tissue engineering applications. Used with oxygen sensor spots these devices allow non-invasive oxygen monitoring in culture vessels, so there is no risk of contamination. Even online monitoring in perfusion systems can easily be conducted with the OXY-1 SMA or ST connected to a single-use flow-through cell. No matter where you want to measure - the OXY-1 devices are your tool for precise oxygen measurements!

Robust Oxygen Meters for Industrial Environments

The OXY-1 WM (trace) with its splash-proof housing & connector ducts is ideally suited for oxygen measurements in harsh environments. The space-saving installation and the display that allows fast checks on oxygen levels are just some of the advantages this robust oxygen meter has to offer. It can be integrated in process units via 4 - 20 mA outputs or digitally via RS485 ModBus RTU. A concentration alarm relay is integrated and can be used as process trigger when reaching high or low concentration levels. Due to the optical working principle measurements can safely be conducted in a secure environment while the wall mount oxygen meter is installed in a separated area.

Quality Control

Set up in a few easy steps our oxygen meters which allow fast assessment of the oxygen content in products or containers. Avoid oxidative deterioration and determine the shelf life of your packed products, check oxygen taken up while filling or the air-tightness of packaging. O_2 content in headspace as well as in liquid products can be measured. As these oxygen meters can be combined with sensors in different designs, e. g. microsensors, dipping probes, or sensor spots for non-invasive O_2 measurements, they can be applied in any stage of the production or filling process and deliver most precise results.

Fibox 4 & Fibox 4 trace

The wireless Fibox 4 and Fibox 4 trace with a robust splash-proof housing are designed for easy handheld use. The integrated long-lasting battery and immense storage capacity allow for prolonged computer-independent work.

Microx 4 & Microx 4 trace

Microx 4 and Microx 4 trace are portable, multi-purpose meters for oxygen measurements in almost any application. They can be used with non-invasive sensors and robust probes as well as oxygen microsensors in different designs.

Fibox 3 LCD trace

The Fibox 3 LCD trace is a portable oxygen meter with display, built-in data logger, rechargeable batteries and programmable analogue outputs. It can also be controlled via PC. The oxygen meter can be used with sensors for normal, trace, and ultra-low oxygen ranges.

OXY-1 WM & OXY-1 WM trace

These wall mount oxygen meters offer temperature, pressure and salinity compensated measurements. The housing is splash-proof (protection class IP64) so the devices can be installed in harsh industrial environments. OXY-1 WM trace allows measurements from 0.5 ppmv to 100 % oxygen.

Specifications

	Fibox 4 & Fibox 4 trace	Microx 4 & Microx 4 trace	Fibox 3 LCD trace	OXY-1 WM & OXY-1 WM Trace
Specifications				
Oxygen sensors	FB 4: PSt3 FB 4 trace: PSt3, PSt6, PSt9	MX 4: PSt7 MX 4 trace: PSt7, PSt8	PSt3, PSt6, PSt9	OXY-1 WM: PSt3 OXY-1 WM Trace: PSt3, PSt6, PSt9
Temperature sensor	Pt100 temperature connector (sensor not included)		Pt1000 temperature connector (sensor included)	Duct for Pt100 4-wire temperature sensor; cable diameter 5 - 9 mm
Temperature performance	From 0 °C to + 50 °C, resolution: ± 0.1 °C		From 0 °C to + 50 °C, resolution: ± 0.1 °C, accuracy: ± 1.0 °C	-
Power supply	4 AA Nickel-metal hybrid cells (min. 2200 mAh) Use only supplied AC adapter (5VDC / min. 1 A) for recharging.		16.8 VDC / max. 2 A	Duct for AC 100 - 240 VAC (with PSU) or 18 - 30 VDC power lead; cable diameter 5 - 9 mm
Max. battery operating time	16 hrs. (3 sec. interval measurement, default LED intensity, display backlight OFF, at room temperature)		8 hrs. (sampling rate 1 sec.)	-
Temperature: operating / storage	From 0 to + 50 °C / - 20 to + 70 °C		From 0 to + 50 °C / - 10 to + 60 °C	From - 40 °C to + 90 °C / - 20 °C to + 70 °C
Relative humidity	Up to 80 % (non condensing)		Up to 80 % (non condensing)	
Dimensions	37 mm x 180 mm x 119 mm		215 mm x 120 mm x 95 mm	241 mm x 229 mm x 106 mm
Weight	0.65 kg (w/o batteries and protection kit) 0.78 kg (w/ batteries & protection kit)		1.65 k g	1.65 kg
Digital interface	USB interface (cable included)		RS232 interface (cable included)	Duct for serial communication: RS485 via ModBus RTU, RS232 via ModBus RTU, Ethernet via ModBus RTU USB-2.0-Mini-B Port for data I/O
Analogue interface	-		Dual current outputs, 4 - 20 mA, with galvanic isolation, O_2 range programmable Dual voltage output, 0 - 10 V, with galvanic isolation, O_2 range programmable Dual voltage input, 0 - 10 V, with galvanic isolation, resolution: 12 bit, programmable	Input: 4 - 20 mA for pressure measurement Output: Two individually configurable 4 - 20 mA outputs, 4 - 20 mA output range, max. load 800 Ohm Error output relay and concentration alarm relay Service software for analog output configuration available
Display	3.5" color TFT, 320 x 240 Pixel		Dot matrix LCD, foil keyboard, 4 keys	3.5" color TFT, 70.08 mm x 52.56 mm, 320 x 240 pixels
Internal memory	4 GB memory (about 10,000,000 data sets) Export via included software		25,000 data sets Export via included software	4 GB memory (about 10,000,000 data sets)

OXY-1 SMA & OXY-1 SMA trace

Due to their small outer dimensions these oxygen meters can be set up almost anywhere. They are compatible with non-invasive spots, dipping probes and flow-through cells. The devices have temperature, pressure and salinity compensation.

OXY-1 ST & OXY-1 ST trace

The extremely small and light-weighed oxygen meters and are designed for our microsensors but can also be used with ST-compatible sensor spots, dipping probes and flow-through cells. They are suitable for almost any application. OXY-1 ST devices have temperature, pressure and salinity compensation.

OXY-4 SMA & OXY-4 SMA trace

These 4-channel oxygen meters are the compact solution for taking oxygen measurements with 4 sensors simultaneously. The devices are controlled with the PreSens Measurement Studio 2 software.

OXY-4 ST & OXY-4 ST trace

These 4-channel devices allow measurements with 4 microsensors, non-invasive sensors, dipping probes or flow-through cells simultaneously. Controlled via PreSens Measurement Studio 2 they have temperature, pressure and salinity compensation.

Multi-channel Devices & Set-ups

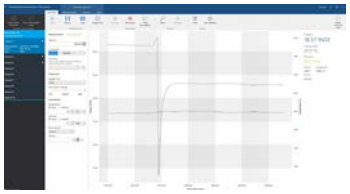
PreSens offers customized oxygen meters with various channel numbers according to customer requirements. Also multiple single- and multi-channel meters can be combined in a multi-channel set-up and controlled via the PreSens Measurement Studio 2 software.

All-in-one Solutions

PreSens also offers the OXYPro® series probes, where the electro-optical module and sensor are combined in a stainless steel housing. No extra meter is needed. These extremely robust probes can be applied in many applications (see p. 25).

Specifications

	OXY-1 SMA & OXY-1 SMA Trace	OXY-1 ST & OXY-1 ST Trace	OXY-4 SMA & OXY-4 SMA Trace	OXY-4 ST & OXY-4 ST Trace
Specifications				
Oxygen sensors	OXY-1 SMA: PSt3 OXY-1 SMA Trace: PSt3, PSt6	OXY-1 ST: PSt7 OXY-1 ST Trace: PSt7, PSt8	OXY-4 SMA: PSt3 OXY-4 SMA Trace: PSt3, PSt6	OXY-4 ST: PSt7 OXY-4 ST Trace: PSt7, PSt8
Temperature sensor	Pt100 temperature connector (sensor not included)			
Temperature performance	From 0 °C to + 50 °C, resolution: ± 0.1 °C, accuracy: ± 1.0 °C			
Power supply	5 VDC (USB-2.0-Mini-B, cable included)			
Temperature: operating / storage	From 0 °C to + 50 °C / - 20 °C to + 70 °C			
Relative humidity	0 to 80 % (non condensing)			
Dimensions	95 mm x 34 mm x 30 mm (with connectors)		135 mm x 41 mm x 82 mm (with connectors)	
Weight	0.128 kg		0.59 k g	
Digital interface	USB interface (cable included)			



PreSens Measurement Studio 2

This software enables to operate several single- and multi-channel meters that are connected to a PC simultaneously. The intuitive measurement control eases performing measurements with a multitude of channels and offers numerous features and functions.

SENSORS

Non-invasive Oxygen Sensors

Robust & in Real Conditions: Look into any Transparent Vessel

The non-invasive optical oxygen sensors measure the partial pressure of both dissolved and gaseous oxygen. They are fixed on the inner surface of the transparent glass or plastic material. The oxygen concentration can then be measured in a contactless and non-destructive manner from outside, through the wall of the vessel. Different coatings for different concentration ranges are available.

- Online monitoring without sampling
- Applicable from microliter scale to production scale
- Contactless & non-destructive measurement
- Pre-calibrated & ready-to-use
- Integrated in disposables
- For bags & single-use bioreactors
- For PET & glass bottles

Is your application missing? Contact us and we find your customized solution!

Examples for Applications

Pharma Industry: Oxygen Monitoring in Bags

Bags and single-use bioreactors are in the process of revolutionizing the way biopharmaceuticals are manufactured. Our non-invasive oxygen sensors are the tools to make the cultivation vessels fully disposable. With non-invasive pH sensors also being available, the two key parameters oxygen and pH can be controlled online.

Food & Beverage: Oxygen Permeation Measurement in PET Bottles

Non-invasive oxygen sensors measure both in liquid and in gaseous (headspace) phases. They perform through transparent materials up to a thickness of 10 mm and even through slightly opaque packaging. The sensor spot is read out via polymer optical fiber from the outside. Adjustable mountings and bespoke fixtures are available. This system allows even the parallel measurement of different bottles as the fiber can be moved from bottle to bottle.

Bioprocess Development: Oxygen Monitoring in Shake Flasks

Shake flask cultures are widely applied in academic and industrial bioprocess development. Although O_2 supply is one of the major issues in the cultivation of aerobic organisms, adequate methods for real monitoring of dissolved oxygen were missing, and sufficient O_2 supply was usually assumed. PreSens non-invasive oxygen sensors integrated in shake flasks now enable online oxygen monitoring and give new insights into metabolic activities.

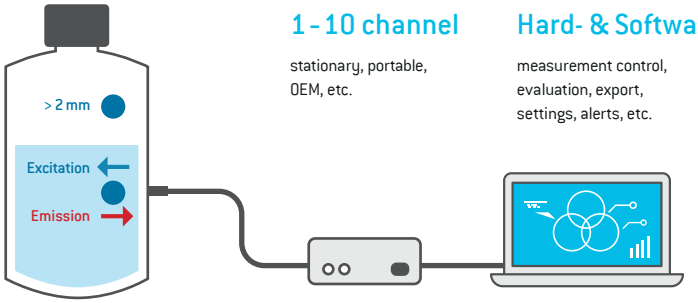
Respiration & Photosynthesis: Oxygen Monitoring in Glass Vials

Determination of respiratory activity is often performed for water organisms such as invertebrates, larval stages or eggs, but also for bacteria, cell cultures, yeasts or fungi. For algae measurement of photosynthetic activity is of great interest. Using 20 mL SensorVials with an integrated sensor stripe oxygen can be measured simultaneously in the liquid sample and in the headspace. Autoclavable SensorVials for stirred and non-stirred applications are available.

SPECS

NORMAL RANGE	0-100 % O_2
TRACE RANGE	0-5 % O_2
ULTRA TRACE RANGE	0-200 ppm

SET-UP



1 - 10 channel

stationary, portable, OEM, etc.

Hard- & Software

measurement control, evaluation, export, settings, alerts, etc.

APPLICATION

Plastic & Glass

from µL to production scale

Indoor & Outdoor

Research & Industry

O_2 Sensor Spots SP and Self-adhesive SP-SA

O_2 sensor spots are mounted in transparent vessels and then read out contactless from the outside – through the container wall. The sensors are pre-calibrated and ready-to-use. Different sensor types for measurements in normal, trace and ultra-low oxygen ranges are available.

O_2 SensorPlug

The O_2 SensorPlug is designed for milli- and microfluidic applications. With the appropriate chip and port design, these allow online monitoring of O_2 on your microfluidic device. An optical sensor is attached to e.g. a Mini-Luer plug, which can easily be integrated in your chip. A polymer optical fiber with 1 mm diameter connects the plug with an oxygen meter.

20 mL SensorVials SV

A 20 mL glass vial is equipped with an optical oxygen sensor stripe. The Vial Adapter holds the fiber in place and is adjustable in different heights. For stirred applications, vials are available where the sensor stripe does not reach all the way to the bottom.

DO Nice Ports

These ports with integrated sensors are for customized applications in mixing or storage bags. The ports are made of polyethylene which allows easy welding with the cultivation bag. For contactless sensor read-out the port is connected to a polymer optical fiber.

Is your application missing? Contact us and we find your customized solution!

Specifications

For Fibox & OXY-1/-4 SMA Series

	Sensor Type PSt3		Sensor Type PSt6		Sensor Type PSt9
Specifications	**Gaseous & Dissolved O_2**	**Dissolved O_2**	**Gaseous & Dissolved O_2**	**Dissolved O_2**	**Gaseous O_2**
Measurement range	0 – 100 % O_2 0 – 1000 hPa	0 – 45 mg/L 0 – 1400 µmol/L	0 – 5 % O_2 0 – 41.4 hPa	0 – 2 mg/L 0 – 56.9 µmol/L	0 - 200 ppmv O_2
Limit of detection	0.03 % oxygen	15 ppb	0.002 % oxygen	1 ppb	0.5 ppmv O_2
Resolution	± 0.01 % O_2 at 0.21 % O_2 ± 0.1 % O_2 at 20.9 % O_2 ± 0.1 hPa at 2 hPa ± 1 hPa at 207 hPa	± 0.004 mg/L at 0.091 mg/L ± 0.045 mg/L at 9.1 mg/L ± 0.14 µmol/L at 2.83 µmol/L ± 1.4 µmol/L at 283.1 µmol/L	± 0.0007 % O_2 at 0.002 % O_2 ± 0.0015 % O_2 at 0.2 % O_2 ± 0.007 hPa at 0.023 hPa ± 0.015 hPa at 2.0 hPa	± 0.0003 mg/L at 0.001 mg/L ± 0.0006 mg/L at 0.09 mg/L ± 0.010 µmol/L at 0.03 µmol/L ± 0.020 µmol/L at 2.8 µmol/L	10 ± 0.5 ppmv O_2 100 ± 0.8 ppmv O_2 200 ± 1.5 ppmv O_2
Accuracy**	± 0.4 % O_2 at 20.9 % O_2 ± 0.05 % O_2 at 0.2 % O_2		± 1 ppb or ± 3 % of the respective concentration whichever is higher		± 2 ppmv O_2 or ± 5 % whichever is higher
Measurement temperature range	From 0 °C to + 50 °C		From 0 °C to + 50 °C		From 0 °C to + 40 °C
Response time (t_{90})	< 6 sec.	< 40 sec.	< 6 sec.	< 40 sec.	< 3 sec.
Properties					
Compatibility	Aqueous solutions, ethanol, methanol				Gas phase only
No cross-sensitivity	pH 1 – 14, CO_2, H_2S, SO_2, Ionic species				CO_2, SO_2
Cross-sensitivity	Organic solvents, such as acetone, toluene, chloroform or methylene chloride, chlorine gas				Organic vapor, chlorine gas
Sterilization procedures	Steam sterilization*, ethylene oxide (EtO), gamma-irradiation				-
Cleaning procedures	Cleaning in place (CIP, 2 % NaOH, + 80 °C, + 176 °F)*, 3 % H_2O_2, acidic agents (HCl, H_2SO_4) max. 4 – 5 %				-
Calibration	Two-point calibration in oxygen-free environment (nitrogen, sodium sulfite) and air-saturated environment		Two-point calibration in oxygen-free environment (nitrogen) and a second calibration value optimally between 1 and 2 % oxygen		Two-point calibration in oxygen-free environment (nitrogen 6.0) and a second calibration value optimally between 100 and 200 ppm gaseous oxygen
Storage stability	5 years provided the sensor material is stored at room temperature in dry conditions and in the dark				

*not for SP-PStx-NAU and SP-PStx-SA
**after two-point calibration as described in the manual

For Microx 4 & OXY-1/-4 ST Series

	Sensor Type PSt7		Sensor Type PSt8	
Specifications	**Gaseous & Dissolved O_2**	**Dissolved O_2**	**Gaseous & Dissolved O_2**	**Dissolved O_2**
Measurement range	0 - 100 % O_2 0 - 1000 hPa	0 - 45 mg/L 0 - 1400 µmol/L	0 - 10 % O_2 0 - 100 hPa	0 - 4.5 mg/L 0 - 140 µmol/L
Limit of detection	0.02 % O_2	10 ppb	0.005 % O_2	2 ppb
Resolution	± 0.01 % O_2 at 1 % O_2 ± 0.05 % O_2 at 20.9 % O_2	± 0.005 mg/L at 0.4 mg/L ± 0.025 mg/L at 9.0 mg/L	± 0.002 % O_2 at 0.008 % O_2 ± 0.06 % O_2 at 2.5 % O_2	± 0.7 ppb at 3 ppb ± 2.5 ppb at 1000 ppb
Accuracy*	± 0.05 % O_2 or < 3 % rel.		± 3 ppb or < 3 % rel.	
Measurement temperature range	From 0 °C to + 50 °C		From 0 °C to + 50 °C	
Response time (t_{90})	< 3 sec.	< 10 sec.	< 3 sec.	< 10 sec.

*after two-point calibration as described in the manual

SENSORS

Oxygen Flow-through Cells

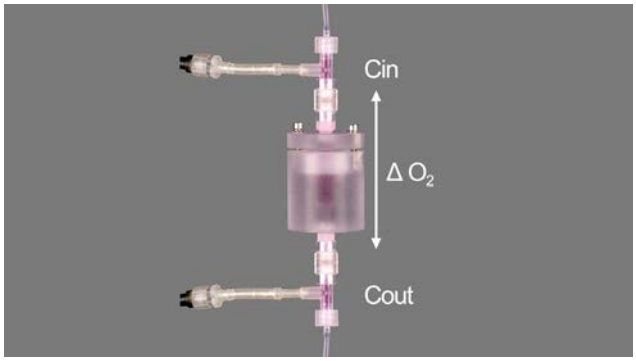
Online Monitoring of Oxygen in Perfusion Systems

Chemical optical oxygen sensors integrated in plastic or metal flow-through cells (FTCs) allow non-invasive online monitoring in perfusion systems or production lines. The sensors are either fixed to color coded sticks, which can be attached to flow-through cells of different sizes and shapes, or to optical exchange windows which are installed in the cell. A polymer optical fiber connects the sensor inside the flow-through cell to the respective oxygen meter. Plastic FTCs are made of polycarbonate and can be delivered beta-irradiated or untreated, while metal flow-through cells stand CIP or steam sterilization.

- Single-use & re-usable flow-through cells
- Metal flow-through cells for µL or production scale volumes
- Precise online monitoring of oxygen in liquids or gases
- Different sizes and shapes for various flow rates
- Easy connection to external tubing

Is your application missing? Contact us and we find your customized solution!

Examples for Applications



Online Oxygen Measurement in Perfusion Systems

Beta-irradiated and pre-calibrated oxygen and pH flow-through sensors can be integrated into perfusion systems. This allows easy control of process parameters in perfusion reactors. Typically, Luer connectors are used, though different sizes for larger flow rates are also available.

In-line Oxygen Measurements in the Brewing and Beverage Industries

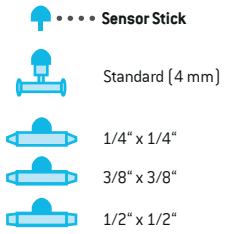
Even low concentrations of oxygen influence the shelf life and the taste of certain beverages. Due to the exceptionally low detection limit and outstanding accuracy of PreSens trace oxygen sensors integrated in flow-through cells, the quality of oxygen-sensitive products such as beer, wine and soft drinks is secured. The optical sensors inside the FTMs have – compared to standard electrodes – a very fast response time and they are very easy to maintain.

pH and pO_2 Control in a Bio-reactor via FTCs in a Bypass

The flow-through cells with oxygen and pH sensors can also be installed in a bypass of a bioreactor. Connected to an oxygen and pH meter their signal can be used for regulation of oxygen and pH levels inside the bioreactor.

SPECS

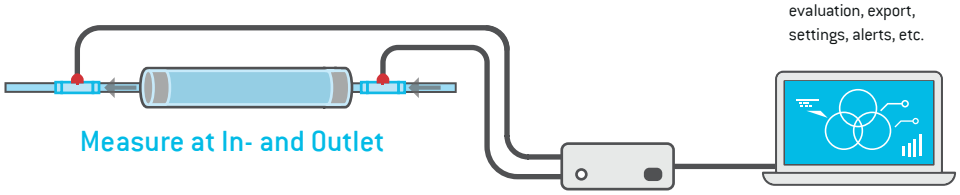
Different sizes
for various flow rates



SET-UP

1 - 10 channel
stationary

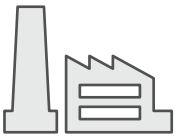
Hard- & Software
measurement control, evaluation, export, settings, alerts, etc.



APPLICATION

Cell Culture
Perfusion Bioreactor
Environmental Research
Animal Physiology

Indoor
Research & Industry



O_2 Flow-through Cell FTC

An oxygen sensor stick is delivered in a T-cell made of poly-carbonate. A polymer optical fiber connects the sensor to the oxygen meter. This FTC can be delivered in different sizes (4 mm, 1/4” x 1/4”, 1/2” x 1/2”, and 3/8” x 3/8”) for different flow rates.

Autoclavable O_2 Flow-through Cell FTC-YAU

A glass tube with an inner diameter of 2 mm is coated with an optical oxygen sensor at its inner wall. The volume for liquid inside the FTC is about 100 µL. This type of oxygen flow-through cell is autoclavable.

O_2 Microsensor Integrated in Metal Cell FTCM

A microsenor is integrated in a stainless steel tee with con-nectors for 1/16” steel tubing. The inner volume of 2.1 µL is extraordinarily small. It is suited for all applications where only small volumes or low flow rates are applied.

O_2 Probes integrated in Metal or Teflon® Flow-through Connectors FTM & FTCT

An oxygen exchange window (OEW) is integrated in these flow-through connector. The FTM can be integrated in pipes with o.d. of 6 mm or other diameters using the respective adapters. FTCTs are solvent-resistant and compatible with TMAH. The integrated oxygen probes are available for different measurement ranges.

Is your application missing? Contact us and we find your customized solution!

Specifications

For Fibox & OXY- Series

	Sensor Type PSt3	Sensor Type PSt6
Specifications		
Measurement range	0 – 100 % O_2 0 – 45 mg/L 0 – 1400 µmol/L	0 – 5 % O_2 0 – 2 mg/L 0 – 56.9 µmol/L
Resolution	± 0.004 mg/L at 0.091 mg/L ± 0.045 mg/L at 9.1 mg/L ± 0.14 µmol/L at 2.83 µmol/L ± 1.4 µmol/L at 283.1 µmol/L	± 0.0003 mg/L at 0.001 mg/L ± 0.0006 mg/L at 0.09 mg/L ± 0.010 µmol/L at 0.03 µmol/L ± 0.020 µmol/L at 2.8 µmol/L
Accuracy*	± 0.4 % O_2 at 20.9 % O_2 ± 0.05 % O_2 at 0.2 % O_2	± 1 ppb or ± 3 % of the respective concentration whichever is higher
Measurement temperature range	From 0 °C to + 50 °C	From 0 °C to + 50 °C
Response time (t_{90})**	< 30 sec.	< 40 sec.
Properties		
Compatibility	Aqueous solutions, ethanol, methanol	
Cross-sensitivity	Organic solvents, such as acetone, toluene, chloroform or methylene chloride Chlorine gas	
Sterilization procedures***	Steam sterilization (only FTC-YAU and FTM) Ethylene oxide (EtO) Irradiation (only FTC-SU)	
Calibration	Two-point calibration in oxygen-free environment (nitrogen, sodium sulfite) and air-saturated environment	Two-point calibration in oxygen-free environment (nitrogen)and a second calibration value optimally between 1 and 2 % oxygen
Storage stability	Irradiated FTC: 18 months provided the sensor is stored in the dark at room temperature and under dry conditions Untreated FTC: up to 5 years provided the sensor is stored in the dark at room temperature and under dry conditions	

*after two-point calibration as described in the manual
**equilibrated FTC with physiological solution and sufficient flow rate (min. 15 mL/min) at + 37 °C
***recalibration may be required

For Microx 4 & Microx 4 trace

	Sensor Type PSt7
Specifications	**Gaseous & Dissolved O_2**
Measurement range	0 - 45 mg/L 0 - 1400 µmol/L
Limit of detection	10 ppb
Resolution	± 0.005 mg/L at 0.4 mg/L ± 0.025 mg/L at 9.0 mg/L
Accuracy*	± 0.05 % O_2 or < 3 % rel.
Measurement temperature range	From 0 °C to + 50 °C
Response time (t_{90})	< 10 sec.

*after two-point calibration as described in the manual

SENSORS

Oxygen Probes for Research & Industrial Applications

Robust Optical Probes with Stainless Steel Housings

PreSens optical oxygen probes are available in various designs for most different applications like industrial process control or environmental research. They measure both gaseous and dissolved oxygen and are available for different measurement ranges from 0.5 ppmv up to 100 % oxygen. With their high grade stainless steel housings these probes stand harsh conditions and are safe for application in e. g. food production and filling or biotechnological processes. Fiber optical probes, connected to one of our various oxygen meters are even suitable for installation in hazardous areas. The all-in-one OXYPro® series is directly connected to a control unit and the ideal solution for process monitoring.

- Different measurement ranges from 0.5 ppmv to 100% oxygen
- Probes for in-line measurement in the industries
- Direct connection to the controller
- Autoclavable, SIP (+ 130 °C, 1.5 atm) & CIP (+ 80 °C, 2 % NaOH)
- Probes for installation in hazardous areas
- Small in size for environmental applications
- Polarization free
- No membrane cleaning
- Pressure resistant

Is your application missing? Contact us and we find your customized solution!

Examples for Applications

Process Control in Biotech & Pharma

The oxygen probes for in-line measurement are designed for harsh conditions like high pressure or oil / water mixtures. These systems give high accuracy and are almost maintenance-free as they do not contain membranes and electrolytes. The sensors stand autoclaving, as well as steam sterilization and cleaning in place.

In-line Oxygen Measurement in the Brewing and Beverage Industries

Even low concentrations of oxygen influence the shelf life and the taste of certain beverages. Due to the extraordinary low detection limit and outstanding accuracy of PreSens trace oxygen sensors the quality of oxygen-sensitive products such as beer, wine and soft drinks is secured. The optical sensors have – compared to standard electrodes – very fast response time and they are very easy to maintain.

Long-term Measurements in Soil

PreSens offers dipping probes, which do not consume oxygen in the measurement process. As the probes are long-term stable they can be implanted in soil for many years! Due to their small dimensions they do not disturb the flow and mass-transport and consequently display the in-situ oxygen concentration. With this method the process of soil aeration, which is very critical for plant productivity, can be investigated.

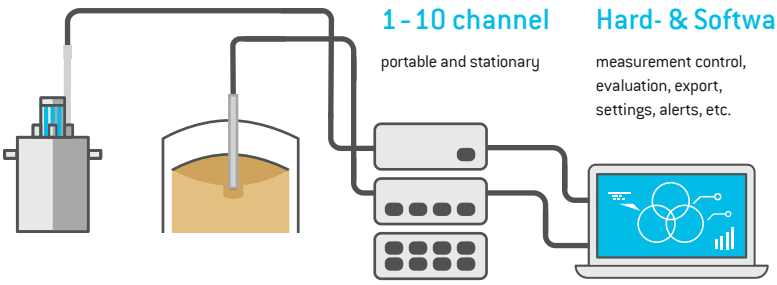
Enivronmental Research – Investigation in Soil Filters

Due to the small outer dimensions and mechanical robustness the oxygen dipping probes offer the possibility to measure the oxygen content in-situ in columns filled with filter sand during the flow of sewage. The results show that a lack of oxygen stops the nitrification process.

SPECS

NORMAL RANGE	0-100 % O_2
TRACE RANGE	0-5 % O_2

SET-UP



1 - 10 channel

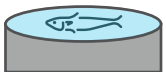
portable and stationary

Hard- & Software

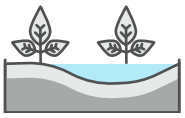
measurement control, evaluation, export, settings, alerts, etc.

APPLICATION

Aquaculture



Soil & Environment



Indoor & Outdoor

Food & Beverage

Oxygen Probe for In-line Measurement OIM

The OIM consists of a housing made of stainless steel with an optical exchange cap (OEC). The OEC is screwed to the top of the metal fitting and contains the oxygen sensor; it can be replaced. The OIM has a standardized thread and length and is compatible with most bioreactors and port adapters of 10 cm. Other lengths are available on request.

Oxygen Dipping Probe DP

The Oxygen Dipping Probe consists of a polymer optical fiber where one end is coated with an oxygen-sensitive foil. The end of the polymer optical fiber is covered with a high-grade steel tube to protect both the sensor material and the optical fiber. The steel tube has an outer diameter of 3 or 4 mm and a length of 10 cm. Other lengths are available on request.

Oxygen Exchange Caps OECs

These sensor caps are available for different measurement ranges and in different designs, e. g. with optical isolation, USP class VI compatible and a special version safe for food applications. The caps can be used to replace a used sensor coating on OIMs, OXYBase® or OXYPro® probes.

Is your application missing? Contact us and we find your customized solution!

Specifications

For Fibox & OXY-1/-4 SMA Series

	Sensor Type PSt3	Sensor Type PSt6	Sensor Type PSt9
Specifications	**Gaseous & Dissolved O_2**	**Gaseous & Dissolved O_2**	**Gaseous O_2**
Measurement range*	Optimal: 0 - 50 % O_2, 0 - 22.5 mg/L Max.**: 0 - 100 % O_2, 0 - 45 mg/L	Optimal: 0 - 5 % O_2, 0 - 2 mg/L Max.**: 0 - 10 % O_2, 0 - 4.5 mg/L	0 - 200 ppmv O_2
Limit of detection	± 0.03 % O_2, ± 0.020 mg/L	± 0.002 % O_2, ± 1 ppb	0.5 ppmv O_2
Resolution*	1 ± 0.02 % O_2 20.9 ± 0.1 % O_2 50 ± 0.4 % O_2	0.002 ± 0.0006 % O_2 0.2 ± 0.001 % O_2 2 ± 0.012 % O_2	1 ± 0.15 ppmv O_2 100 ± 0.8 ppmv O_2 200 ± 1.5 ppmv O_2
Accuracy****	1 ± 0.05 % O_2, 20.9 ± 0.2 % O_2	± 3 % rel. or ± 1 ppb, whichever is higher	± 5 % rel. or ± 2 ppmv O_2, whichever is higher
Response time (t_{90})	< 10 sec. (gas) / < 30 sec. (liquid)	< 10 sec. (gas) / < 30 sec. (liquid)	< 10 sec.
Properties			
Compatibility	Aqueous solutions, ethanol, methanol		Gas phase only
No cross-sensitivity	pH 1 – 14, CO_2, H_2S, SO_2, Ionic species		CO_2, SO_2
Cross-sensitivity	Organic solvents, such as acetone, toluene, chloroform or methylene chloride, chlorine gas		Organic vapor, chlorine gas
Sterilization procedures	Steam sterilization***, ethylene oxide (EtO)		-
Cleaning procedures	Cleaning in place (CIP, 2 % NaOH, + 80 °C, + 176 °F)***, 3 % H_2O_2, acidic agents (HCl, H_2SO_4) max. 4 – 5 %		-
Storage stability	5 years provided the sensor material is stored at room temperature in dry conditions and in the dark		

*at + 20 °C, 960 - 980 hPa; humidified gas mixture
**after customized calibration
***only for OIM with autoclavable Oxygen Exchange Cap (OEC-YAU)
****after two-point calibration as described in the manual

For Microx 4 & OXY-1/-4 ST Series

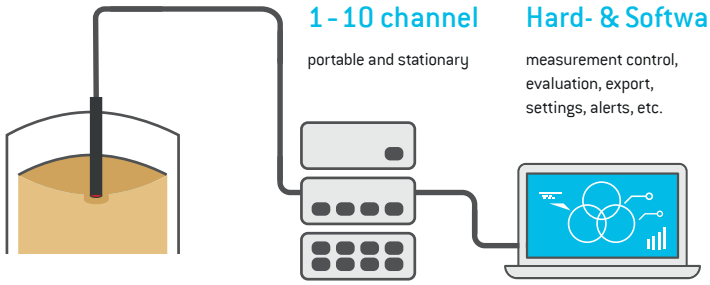
	Sensor Type PSt7	Sensor Type PSt8
Specifications		
Measurement range*	Optimal: 0 - 50 % O_2, 0 - 22.5 mg/L Max.**: 0 - 100 % O_2, 0 - 45 mg/L	Optimal: 0 - 10 % O_2, 0 - 4.5 mg/L Max.**: 0 - 20.9 % O_2, 0 - 9 mg/L
Limit of detection	± 0.03 % O_2, ± 0.015 mg/L	± 0.007 % O_2, ± 3 ppb
Resolution	1 ± 0.02 % O_2 20.9 ± 0.1 % O_2 0.4 mg/L ± 0.009 mg/L 9 mg/L ± 0.04 mg/L	0.007 ± 0.002 % O_2 0.023 ± 0.005 % O_2 3 ± 1 ppb 10 ± 2 ppb
Accuracy***	1 ± 0.05 % O_2, 20.9 ± 0.2 % O_2	± 3 % rel. or ± 4 ppb, whichever is higher
Response time (t_{90})	< 10 sec. (gas) / < 30 sec. (liquid)	< 10 sec. (gas) / < 30 sec. (liquid)
Properties		
Compatibility	Aqueous solutions, ethanol, methanol	
No cross-sensitivity	pH 1 – 14, CO_2, H_2S, SO_2, Ionic species	
Cross-sensitivity	Organic solvents, such as acetone, toluene, chloroform or methylene chloride, chlorine gas	
Sterilization procedures	Ethylene oxide (EtO)	
Cleaning procedures	3 % H_2O_2, acidic agents (HCl, H_2SO_4) max. 4 – 5 %	
Storage stability	5 years provided the sensor material is stored at room temperature in dry conditions and in the dark	

*at 20 °C, 960 - 980 hPa; humidified gas mixture
**after customized calibration
***after two-point calibration as described in the manual

SPECS

NORMAL RANGE	0-100 % O_2
TRACE RANGE	0-5 % O_2

SET-UP



1 - 10 channel

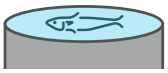
portable and stationary

Hard- & Software

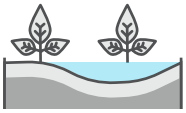
measurement control, evaluation, export, settings, alerts, etc.

APPLICATION

Aquaculture



Soil & Environment



Indoor & Outdoor

Food & Beverage

OXYBase® Series

These compact probes combine an electro-optical module and sensor in a stainless steel housing. The sensor is integrated in a removable cap and can easily be replaced if necessary. These probes are extremely robust and ideally suited for e. g. O_2 monitoring in fish farms.

Oxygen Exchange Caps OECs

These sensor caps are available for different measurement ranges and in different designs, e. g. with hydrophobic Teflon coating, a special version safe for food applications. The caps can be used to replace a used sensor coating on OIMs, OXYBase® or OXYPro® probes.

Oxygen Exchange Cap OEC30

These sensor caps have a tapered tip to reduce air bubble formation when measuring dissolved oxygen. The caps can be used to replace a used sensor coating on OIMs or OXYPro® probes.

Is your application missing? Contact us and we find your customized solution!

Specifications

OXYBase® Series

	OXYBase® WR (OEC Type PSt3)
Specifications	
Measurement range*	Optimal: 0 - 50 % O_2, 0 - 22.5 mg/L Max.**: 0 - 100 % O_2, 0 - 45 mg/L
Properties	
Compatibility	Aqueous solutions, ethanol, methanol, cleaning agents containing ClO_2 at room temperature
Incompatibility	Steam sterilization (+ 121 °C)
Cross-sensitivity	Organic solvents such as acetone, toluene, chloroform or methylene chloride, chlorine gas
Storage stability of sensor cap	5 years provided the sensor is stored at room temperature in dry conditions and in the dark
Temperature sensor	NTC (for temperature compensation of oxygen values only, not suitable for monitoring purposes)
Temperature performance	Accuracy below ± 1 °C
Power supply	OXYBase® WR-RS232: 5 VDC ± 5 % OXYBase® WR-RS485/WR-RS485M: 5 - 30 VDC OXYBase® WR-RS485-A0: 7 - 30 VDC
Power consumption in active mode / stand-by mode	max. 1 W / 0.15 W
Temperature range operation	Optimal from 0 °C to + 40 °C / maximal** from - 10 °C to + 70 °C
Temperature range storage	Optimal at room temperature (+20 °C ± 5 °C) / maximal from 0 °C to + 70 °C
Dimensions	OXYBase® WR-RS232: 12 mm x 81.4 mm OXYBase® WR-RS485/WR-RS485M: 12 mm x 106 mm OXYBase® WR-RS485-A0: 12 mm x 135 mm
Weight	140 g
Digital interface	RS232 (PreSens proprietary) RS485 (PreSens proprietary or Modbus RTU) RS485 4 - 20 mA output

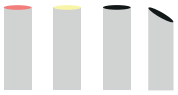
*at + 20 °C, 960 - 980 hPa; humidified gas mixture

**after customized calibration

SPECS

NORMAL RANGE	0-100 % O_2
TRACE RANGE	0-5 % O_2
ULTRA TRACE RANGE	0-200 ppm

Various Caps

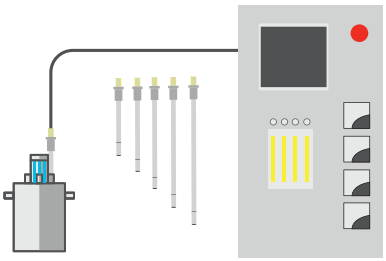


for different media / conditions

SET-UP

OXYPro

Controller/PLC



APPLICATION

Indoor

Research & Industry

Food & Beverage

Specifications

OXYPro® Series

	OXYPro® WR (OEC Type PSt7)	OXYPro® MR (OEC Type PSt8)	OXYPro® TR (OEC Type PSt6)	OXYPro® UTR (OEC Type PSt9)
Specifications				
Measurement range*	Optimal: 0 - 50 % O_2, 0 - 22.5 mg/L Max.**: 0 - 100 % O_2, 0 - 45 mg/L	Optimal: 0 - 10 % O_2, 0 - 4.5 mg/L Max.**: 0 - 20.9 % O_2, 0 - 9 mg/L	Optimal: 0 - 5 % O_2, 0 - 2 mg/L Max.**: 0 - 10 % O_2, 0 - 4.5 mg/L	0 - 200 ppmv O_2
Properties				
Compatibility	Aqueous solutions, ethanol, methanol, cleaning agents containing ClO_2 at room temperature			Gas phase only
Cross-sensitivity	Organic solvents such as acetone, toluene, chloroform or methylene chloride Chlorine gas			Organic vapor, chlorine gas
Sterilization procedure***	Steam sterilization (max. + 140 °C, 1.5 atm)			
Cleaning procedure***	Cleaning in place (CIP, 2 % NaOH, + 80 °C, + 176 °F)			
Temperature sensor	NTC (for temperature compensation of oxygen values only, not suitable for process monitoring)			
Temperature performance	Accuracy below ± 1 °C			
Power supply	7 - 30 V			
Power consumption in active mode / stand-by mode	max. 1 W / 0.15 W			
Temperature range operation	Optimal from 0 °C to + 50 °C / maximal** from - 40 °C to + 90 °C			From 0 °C to + 40 °C
Temperature range storage	Optimal at room temperature (+20 °C ± 5 °C) / maximal from -10 °C to 70 °C			From - 10 °C to + 70 °C
Dimensions	Max. immersion depth: 120 mm / 225 mm / 325 mm / 425 mm PG13.5 thread and VP8 connector: 55 mm Diameter: 12 mm			
Weight	100 g			
Digital interface	RS485, half duplex (variable Baud rate, default: 19200, data bits: 8, parity: none, stop bits: 1, handshake: none) Optional: RS485 Modbus RTU			
Analog output	4 - 20 mA			

*at + 20 °C, 960 - 980 hPa; humidified gas mixture
**after customized calibration
***not for OEC-PStx-NAU-OIW

Is your application missing? Contact us and we find your customized solution!

OXYPro® Series

The OXYPro® combine an optical sensor and electro-optical module in one probe. The sensor is integrated in a stainless steel cap that is screwed to the probe housing, so a used sensor coating can easily be exchanged. OXYPro® are connected directly to a control unit. They are available for wide, mid-, trace and ultra trace range oxygen measurements. As a digital interface they use RS485 (PreSens proprietary or Modbus RTU). These probes stand steam sterilization and cleaning in place.

Oxygen Exchange Caps OECs

These sensor caps are available for different measurement ranges and in different designs, e. g. with optical isolation, USP class VI compatible and a special version safe for food applications. The caps can be used to replace a used sensor coating on OIMs, OXYBase® or OXYPro® probes.

Oxygen Exchange Cap OEC30

These sensor caps have a tapered tip to reduce air bubble formation when measuring dissolved oxygen. The caps can be used to replace a used sensor coating on OIMs or OXYPro® probes.

OXYPro®-Varivent Adapter

This adapter is made of stainless steel and can be integrated in tanks for easy in-line measurement with the OXYPro®.

OXYPro®-Triclamp Adapter

This adapter is made of stainless steel and can be fastened in tanks for easy in-line measurements with the OXYPro®.

OXYPro®-FTM (Metal Flow-through Cell)

The OXYPro® FTM can be integrated in pipelines for easy in-line measurements with the OXYPro®.

OXYPro®-NPT

This adapter has a NPT 1/2 thread and is made of PVDF.

OAD-D25

The OXYPro® is designed for 12 mm ports (PG 13.5 thread). The OAD-D25 adapter is offered as an accessory which enables connecting the OXYPro® to fermenters with 25 mm ports.

ECS Interface

The wide range probe OXYPro® WR-ECS-120 is available with additional ECS output, if required.

SENSORS

Oxygen Microsensors

Sensor Tip Thinner than a Hair (< 50 µm) – Measure on-the-spot

Oxygen microsensors are miniaturized chemical optical oxygen sensors designed for all research and packaging applications where a small tip size (< 50 µm) and fast response time (t_{90} < 3 sec.) are necessary. The optical oxygen microsensors are based on a 230 µm silica fiber and are available with sensor tip diameters from < 50 µm to 230 µm. The oxygen microsensors are mounted in different housings (needle-type housing, implantable, microprofiling) and offer a unique research tool for investigating systems where micro-invasive and small sensors are needed.

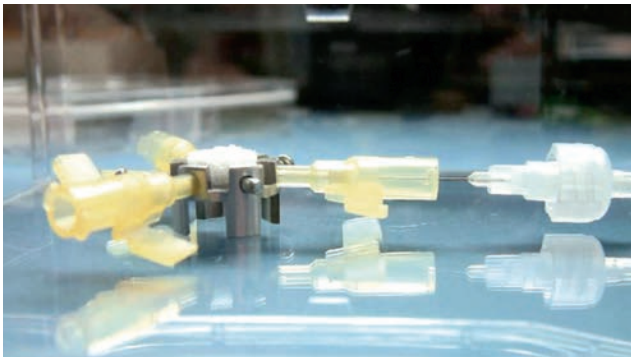
- Insertion in plant and animal tissue
- Measuring in smallest volumes
- Microprofiling of oxygen gradients in biofilms and sediments
- High spatial resolution
- Micro-respiration systems
- Independent of electromagnetic fields

Is your application missing? Contact us and we find your customized solution!

Examples for Applications

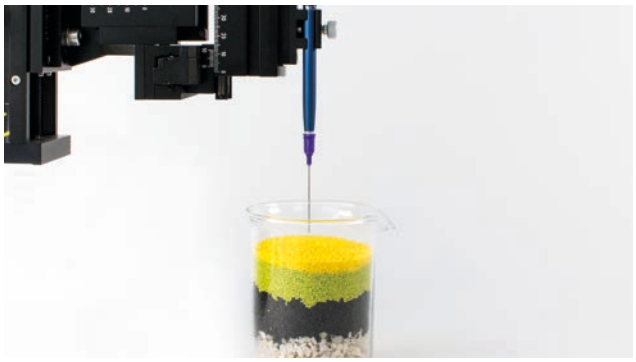
Packaging & Quality Control

Oxygen inside packaging can lead to oxidative deterioration of certain products. Therefore, determination of the oxygen content within packages or pharmaceutical vials is essential to ensure both the filling quality and the long-term storage stability. With our micro-invasive needle-type oxygen microsensors we offer a simple tool to determine residual oxygen both in the headspace and in liquids.



Tissue Engineering

Oxygen microsensors measure the oxygen content in various volume compartments of the tissue engineering constructs. To do so, hair-thin sensors are inserted into the constructs and the oxygen content is measured online. In this way, the oxygen partial pressure is measured with a high local resolution and correlated with the constructs tissue quality (composition of the extracellular matrix).



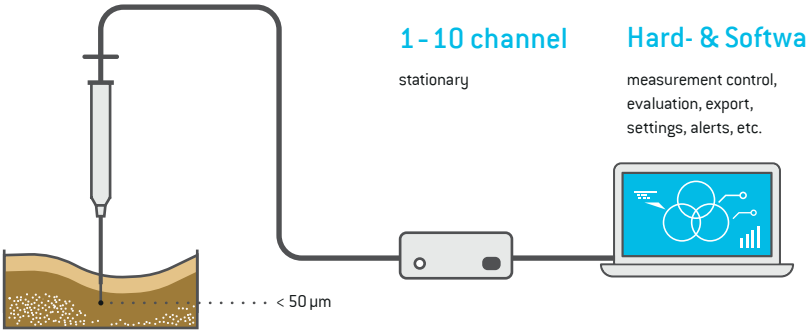
Microprofiling Measurements in Sediments and Tissue

Due to the extraordinary high local resolution (< 50 µm) our oxygen microsensors are ideally suited for recording microprofiles e. g. in sea-floor sediments, biofilms and plant physiology. Combined with our microprofiling equipment – the Manual (MM) or Automated Micromanipulator (AM) – precise localization of the sensor tip inside the sample and vibration-free movement with µm reading accuracy can be realized.

SPECS

NORMAL RANGE	0-100 % O_2
TRACE RANGE	0-10 % O_2
TIP SIZE	< 50 µm

SET-UP



1 - 10 channel

stationary

Hard- & Software

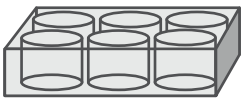
measurement control, evaluation, export, settings, alerts, etc.

APPLICATION

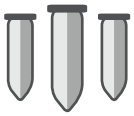
Profiling

Plant & Animal Tissue

Cell & Microbial Culture



Small Volumes



Indoor & Outdoor

Research & Industry

Needle-type Oxygen Microsensors NTH

Needle-type oxygen microsensors measure with high spatial resolution of less than 50 µm. The oxygen-sensitive tip of an optical fiber is protected inside a stainless steel needle. This design is optimally suited for easy penetration of tissue, septum rubber or packaging materials.

Implantable Oxygen Microsensors IMP

Implantable oxygen microsensors are designed for various customized applications. The tiny probe has a tip size of < 50 µm to 230 µm. The bare glass fiber tip can be mounted to your own housings, steel tubes and micro-respirometer chambers etc.

Microprofiling Microsensors PM

The PM is specially designed for microprofiling applications with a close-fitting fiber guidance and a mechanical interlock for precise vertical localization of the measurement tip. A PM should be used for all microprofiling applications in semi-solid substrates.

O_2 Microsensor with Fixed Sensor Tip NFSG

This sensor, where the sensor tip is fixed inside the steel needle, is the ideal tool for all packaging applications, e. g. measurements in blisters. The NFSG is specially designed for measurements in the gas phase.

Is your application missing? Contact us and we find your customized solution!

Specifications

For Microx 4 & OXY-1/-4 ST Series

	Sensor Type PSt7		Sensor Type PSt8	
Specifications	**Gaseous & Dissolved O_2**	**Dissolved O_2**	**Gaseous & Dissolved O_2**	**Dissolved O_2**
Measurement range	0 - 100 % O_2 0 - 1000 hPa	0 - 45 mg/L 0 - 1400 µmol/L	0 - 10 % 02, 0 - 100 hPa 0 - 4.5 mg/L, 0 - 140 µmol/L	0 - 4.5 mg/L 0 - 140 µmol/L
Limit of detection	0.03 % O_2	15 ppb	0.007 % O_2	3 ppb
Resolution	± 0.01 % O_2 at 1 % O_2 ± 0.05 % O_2 at 20.9 % O_2	± 0.005 mg/L at 0.4 mg/L ± 0.025 mg/L at 9.0 mg/L	± 0.002 % O_2 at 0.008 % O_2 ± 0.006 % O_2 at 2.5 % O_2	± 0.7 ppb at 3 ppb ± 2.5 ppb at 1000 ppb
Accuracy*	± 0.05 % O_2 or < 3 % rel.		± 3 ppb or < 3 % rel.	
Measurement temperature range	From 0 °C to + 50 °C		From 0 °C to + 50 °C	
Response time (t_{90})	< 3 sec.	< 10 sec.	< 3 sec.	< 10 sec.

*after two-point calibration as described in the manual

For Microx TX3

	Sensor Type PSt1	
Specifications	**Gaseous & Dissolved O_2**	**Dissolved O_2**
Measurement range	0 – 50 % O_2 0 – 500 hPa	0 – 22.5 mg/L 0 – 700 µmol/L
Limit of detection	0.05 % oxygen	20 ppb
Resolution	± 0.01 % O_2 at 0.21 % O_2 ± 0.09 % O_2 at 20.9 % O_2 ± 0.1 hPa at 2 hPa ± 0.087 hPa at 207 hPa	± 0.005 mg/L at 0.09 mg/L ± 0.04 mg/L at 9.06 mg/L ± 0.14 µmol at 2.83 µmol ± 1.3 µmol at 283 µmol
Accuracy***	± 0.4 % O_2 at 20.9 % O_2; ± 0.05 % O_2 at 0.2 % O_2;	
Drift at 0 % oxygen	< 0.1 % O_2 within 30 days (sampling interval of 1 min.)	
Measurement temperature range	From 0 °C to + 50 °C	
Response time TS* (t_{90})	< 1 sec.	< 2 sec.
Response time TF** (t_{90})	< 15 sec.	< 30 sec.
Properties		
Compatibility	Aqueous solutions, ethanol, methanol	
No cross-sensitivity	pH 1 – 14 CO_2, H_2S, SO_2 Ionic species	
Cross-sensitivity	Organic solvents, such as acetone, toluene, chloroform or methylene chloride Chlorine gas	
Sterilization procedures	Steam sterilization (only implantable & TF** sensor) Ethylene oxide (EtO)	
Cleaning procedures	3 % H_2O_2, ethanol, soap solution	
Calibration	Two-point calibration in oxygen-free environment (nitrogen, sodium sulfite) and air-saturated environment	
Storage stability	5 years provided the sensor material is stored in the dark at room temperature	

*TS: tapered sensor tip with a diameter < 50 µm and no optical isolation

**TF: flat-broken sensor tip with a diameter of 140 µm

***after two-point calibration as described in the manual

MICROPROFILING

Microprofiling Solutions

Vibration-free, High-resolution Control for Your Microsensor

The Automated and Manual Micromanipulator are specifically designed for microprofiling applications with PreSens microsensors. The systems allow moving the microsensor vibration-free in 3 axes with µm reading accuracy and enable exact localization of the sensor in the sample. Automated microprofiling can be performed along one dimension in µm resolution. Whenever insertion of a microsensor in semi-solid or hard substrates is required, the micromanipulators are the safest way to do it, achieving highest accuracy, spatial resolution and stability.

- Vibration-free micromanipulation in 3D
- Fine drive with µm reading accuracy
- Safe-insert function
- Fully automated or manual system
- No electrical interferences due to optical measurement
- Adaptable to any sample

Is your application missing? Contact us and we find your customized solution!

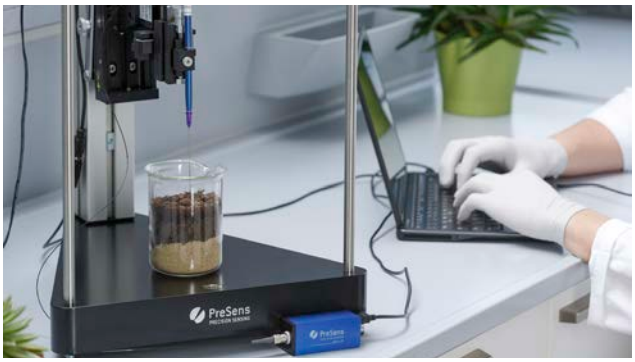
Examples for Applications

Microprofiling in Biological & Environmental Research

The different types of oxygen microsensors allow e. g. measurements in smallest sample volumes or inside tissue. The micromanipulators should be applied whenever it is necessary to insert the microsensor safely into semi-solid samples and when exact localization and stabilization of the microsensor tip within the sample is required. Using the safe-insert function the microsensor tip can be securely inserted and localized at the exact position where you want to conduct your measurements.

Microsensor Measurements in Medical & Life Science Research

PreSens microsensors are ideal tools for medical and life science research, as they allow for precise on the spot measurement and microprofiling inside tissue constructs. The Manual Micromanipulator is an indispensable equipment in these applications for exact localization of the microsensor inside the sample and microprofiling in step sizes down to 10 µm. PreSens needle-type microsensors are already applied in many tissue engineering applications.



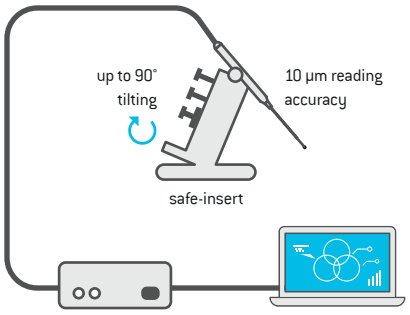
Microprofiling of Sediments, Soils & Biofilms

Together with the specially designed PreSens Profiling Microsensors (PM) the Automated Micromanipulator is the ideal tool for oxygen measurements in sediment, soil and biofilm applications. With a free choice of step zones, travel velocities and wait times different layers inside the sample can be monitored and assessed in step sizes down to 10 µm. The software visualizes the online measurements, so you can follow gradients and identify boundaries immediately while the sensor is automatically moved inside the sample.

Microprofiling for Field Use

Microprofiling made easy. Use our microprofiling solutions for your next field excursion. With our battery powered transmitters you can work outdoors and indoors according to your needs with just one set-up. Our microprofiling equipment is the ideal tool to confirm your *in vitro* findings *in situ*.

MANUAL MICROMANIPULATOR SET-UP



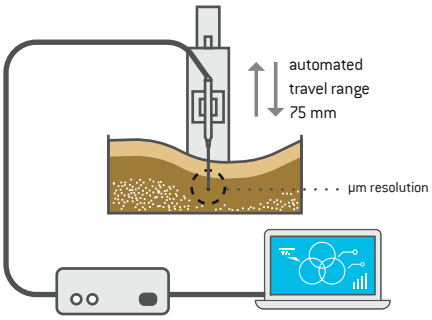
single-channel
stationary

Hard- & Software
measurement control, evaluation, export, settings, alerts, etc.

SPECS

NORMAL RANGE	0-100 % O_2
TRACE RANGE	0-10 % O_2

AUTOMATED MICROMANIPULATOR SET-UP

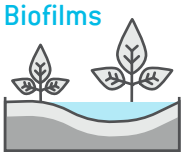


single-channel
stationary

Profiling Studio Software

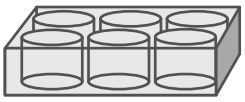
APPLICATION

Sediments & Biofilms



Biology & Environment

Medical Research & Life Science



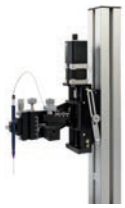
Indoor & Outdoor
Research & Industry

Manual Micromanipulator MM and MM33

The Manual Micromanipulator is specifically designed for PreSens needle-type microsensors (NTH). The system allows moving the microsensor vibration-free in 3 axes with µm reading accuracy. With its solid base plate for a stable set-up the MM can be tilted safely up to 90°. The MM33 comes without the base plate so it can be mounted to customized measurement set-ups. The safe-insert function enables secure insertion of the NTH retracted in its steel needle into your area of interest. The sensor tip can then be extended safely. Whenever insertion of a microsensor in semi-solid or hard substrates is required this is the safest way to do it, achieving highest accuracy and spatial resolution.

Profiling Microsensors PM

The PM is specially designed for microprofiling applications with a close-fitting fiber guidance and a mechanical interlock for precise vertical localization of the measurement tip. A PM should be used for all microprofiling applications in semi-solid substrates.



Automated Micromanipulator AM

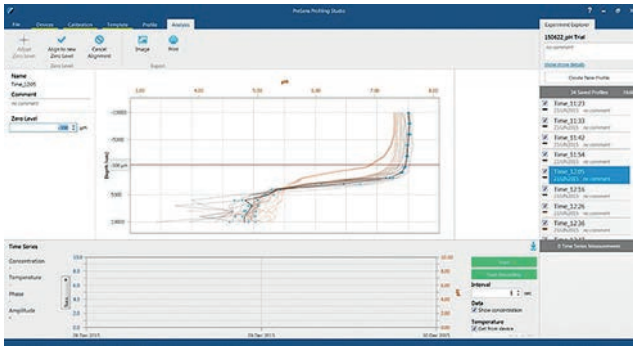
The Automated Micromanipulator AM is specifically designed for microprofiling applications with the PreSens Profiling Microsensor (PM), and can also be operated with needle-type housed (NTH) and implantable (IMP) microsensors. The system allows moving the microsensor vibration-free with µm reading accuracy and enables exact localization of the sensor in the sample. Automated microprofiling can be performed along one dimension in µm resolution. The associated database-supported software PreSens Profiling Studio allows complete control of the AM and the respective oxygen, pH or CO_2 meter via USB. Different step zones, variable travel velocities and waiting times can be defined. The AM is compatible with all PreSens oxygen, pH and CO_2 transmitters.

Is your application missing? Contact us and we find your customized solution!

Specifications

	Manual Micromanipulator (MM)	Manual Micromanipulator (MM33)	Automated Micromanipulator (AM)
Specifications			
Compatibility	Profiling (PM), needle-type housed (NTH) and implantable (IMP) oxygen, pH & CO_2 microsensors	Profiling (PM), needle-type housed (NTH) and implantable (IMP) oxygen, pH & CO_2 microsensors	Profiling (PM), needle-type housed (NTH) and implantable (IMP) oxygen, pH & CO_2 microsensors
Dimensions	230 mm x 130 mm x 200 mm	160 mm x 90 mm x 190 mm	275 mm x 95 mm x 220 mm
Weight	Weight w/o base plate: 1.1 kg Weight with base plate: 3.03 kg	Weight: 1 kg	Weight of AM: 2.07 kg Weight of Heavy Stand: 14 kg
Travel range automated	-	-	x-axis: 75 mm
Travel range manual	x-axis: 37 mm, fine drive 10 mm y-axis: 20 mm z-axis: 25 mm	x-axis: 37 mm, fine drive 10 mm y-axis: 20 mm z-axis: 25 mm	x-axis: 37 mm, fine drive 10 mm y-axis: 20 mm z-axis: 25 mm
Reading accuracy	Coarse adjustment: 0.1 mm Fine adjustment: 0.01 mm	Coarse adjustment: 0.1 mm Fine adjustment: 0.01 mm	-
Coarse positioning	x-axis: 70 mm	x-axis: 70 mm	-
Rotatability	360°	360°	-
Material	Aluminium & steel	Aluminium & steel	Aluminium & steel
Resolution	-	-	1 µm
Repeatability	-	-	< 2.5 µm
Mounting adapter	M6 screw, 13 mm length	M6 screw, 13 mm length	M6 screw, 13 mm length
Power supply	-	-	100 - 240 VAC, 50/60 Hz. Use supplied power adapter (15 VDC, 2.1 mm center positive plug) only.
Digital interface	-	-	USB interface (cable included)
Control software	-	-	PreSens Profiling Studio (compatible with Windows 7, 8, 10 at 32 or 64 bit)

PreSens Profiling Studio Software



This software enables control of the Automated Micromanipulator and connected oxygen, pH or CO_2 meter. PreSens Profiling Studio allows complete control with several step zones, variable travel velocity and waiting times of the AM. It is database supported and offers multiple features from clear data organization and export, annotations, easy creation of profiling templates, to different analysis functions.

SENSOR SOLUTIONS

Oxygen Ingress Measurement

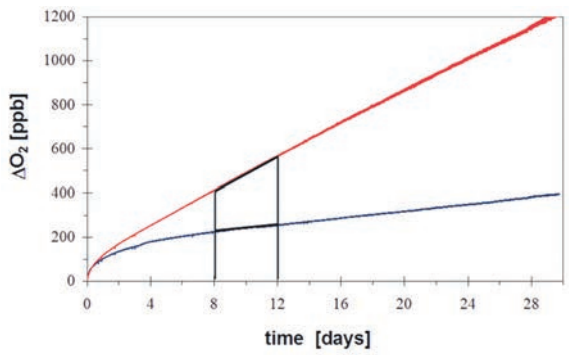
Non-invasive, Non-destructive & Under Real Conditions: Determine the Shelf Life of your Product

Fiber optic oxygen meters determine oxygen permeability of plastic bottles and containers most precisely. Ideal for assurance, production and quality control, this sensor solution incorporates state-of-the-art optical sensor technology. Permeation rates can be confirmed without piercing the package or bottle. PreSens sensor spots enable contactless and non-destructive measurements. A trace oxygen sensor spot is attached to the inner surface of the transparent bottle or package and an optical fiber is positioned outside. The sensor response changes with oxygen concentration on the inside and oxygen ingress can be easily determined.

- Determination of oxygen ingress in PET bottles
- Determination of scavenger capacity
- Determination of oxygen permeation through closures
- Determination of product shelf life
- Contactless & non-destructive online measurements
- Measurements under real conditions
- Sensitive down to 1 ppb dissolved oxygen
- Easy & precise measurements

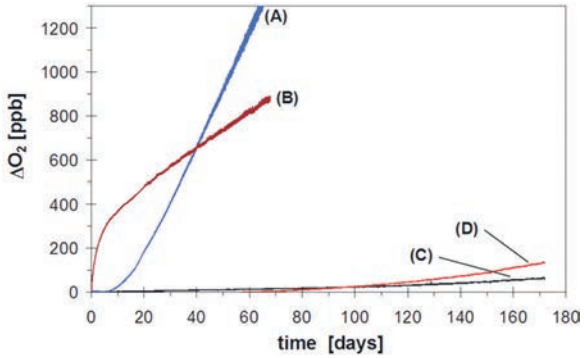
Is your application missing? Contact us and we find your customized solution!

Examples for Oxygen Ingress Measurement in PET Bottles



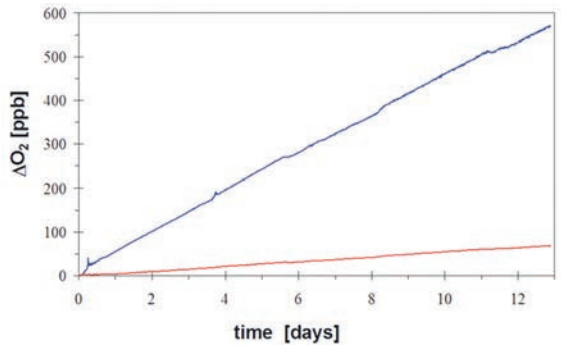
Bottle Type 1: Externally Coated PET Bottles

The oxygen ingress into an externally coated PET bottle (blue line) and the respective reference bottle without coating (red line) are shown over a period of more than 25 days. In the first 48 hours the increase of the oxygen concentration in non-coated bottles and bottles with external coating is non-linear due to the migration of oxygen out of the PET bottle wall. The external barrier coating reduces the rate of permeation.



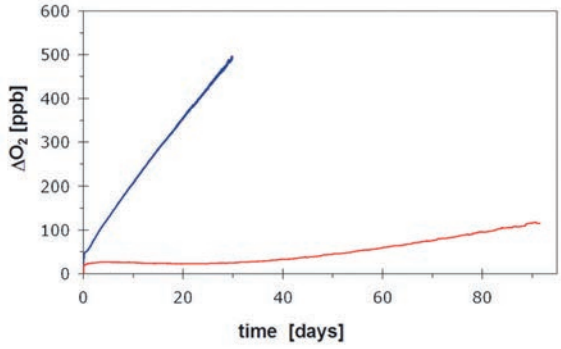
Bottle Type 2: External Coating & Different Oxygen Scavenger Content

Oxygen ingress into differently treated PET bottles of the same type: (A) non-coated PET bottle with 2 % scavenger, (B) externally coated PET bottle with no scavenger, (C) externally coated PET bottle with 1 % scavenger, (D) externally coated PET bottle with 0.5 % scavenger. The combination systems (C) and (D) hold oxygen ingress to less than 1 ppm over six months, which could not be accomplished with the active (scavenger A) or passive barrier (external coating B) alone.



Bottle Type 3: Internally Coated PET Bottles

The inner coating provides an efficient barrier to oxygen (red line), and prevents oxygen desorption from the PET bottle wall into the product during the first few days of storage contrary to bottles coated externally. In this case, a thin layer of amorphous carbon, typically 100 to 200 nm thick, is applied to the inner surface of the bottle. This is deposited from high-energy plasma of acetylene gas within a high vacuum environment.



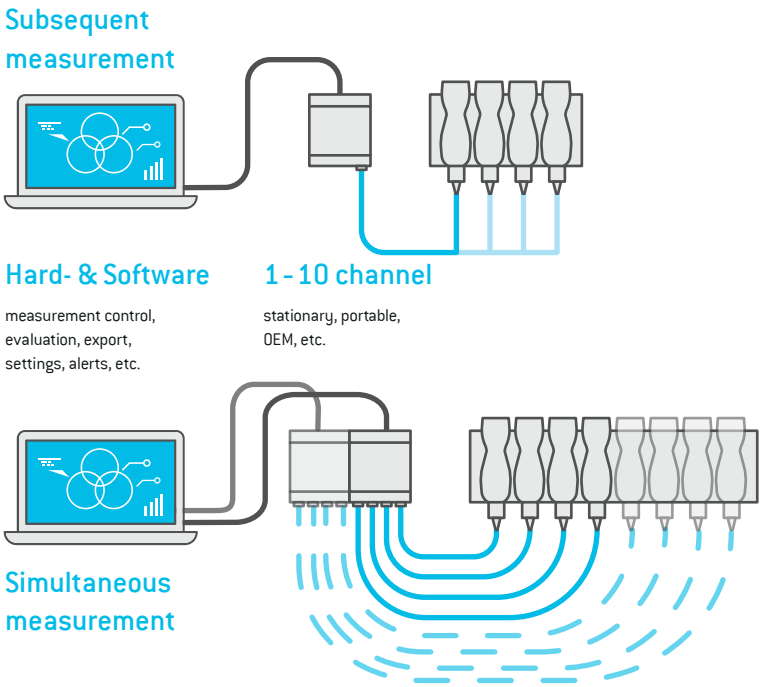
Bottle Type 4: Multilayer Bottles Containing Oxygen Scavenger

Common multilayer structures combine two layers of PET and a middle layer of Nylon MXD6 in three layer structures. The high barrier material is present in separate layers which are made by simultaneous or sequential co-injection (blue line). The combination of a multilayer structure adding an active barrier within the middle layer decreases oxygen ingress significantly, which could not be accomplished with a multilayer structure without an active barrier (red line).

SPECS

NORMAL RANGE	0-100 % O_2
TRACE RANGE	0-5 % O_2
ULTRA TRACE RANGE	0-200 ppm

SET-UP



Fibox 4 trace

The compact Fibox 4 trace is designed for easy handheld use. The robust housing is splash-proof and the controls – color display and buttons – can be operated even while wearing heavy gloves. The integrated long-lasting battery and immense storage capacity allow for prolonged computer-independent work.

Multi-channel Devices & Set Ups

PreSens offers customized oxygen meters with various channel numbers according to customer requirements. Also multiple single- and multi-channel meters can be combined in a multi-channel set-up and controlled via the PreSens Measurement Studio software.

O_2 Sensor Spots SP-PSt6/PSt9

The trace oxygen sensor spots can easily be integrated in transparent containers or PET bottles. The PSt6 type sensor has a measurement range of 0 – 5 % O_2 (gaseous & dissolved), while the PSt9 type sensor measures ultra-low oxygen traces in a range of 0 – 200 ppmv O_2 in gas.

Oxygen-sensitive Cap OSC-PSt6

To determine the oxygen ingress in dark brown or non-transparent PET bottles, directly attaching an oxygen sensor spot to the bottle wall is not possible as the colored material interferes with sensor read-out. To enable non-invasive oxygen ingress measurement also for deeply colored and non-transparent containers PreSens has developed an oxygen-sensitive cap which can be used as closure.

Is your application missing? Contact us and we find your customized solution!

Specifications

For Fibox & OXY-1/-4 SMA Series

	Sensor Type PSt3		Sensor Type PSt6		Sensor Type PSt9
Specifications	**Gaseous & Dissolved O_2**	**Dissolved O_2**	**Gaseous & Dissolved O_2**	**Dissolved O_2**	**Gaseous O_2**
Measurement range	0 – 100 % O_2 0 – 1000 hPa	0 – 45 mg/L 0 – 1400 µmol/L	0 – 5 % O_2 0 – 41.4 hPa	0 – 2 mg/L 0 – 56.9 µmol/L	0 - 200 ppmv O_2
Limit of detection	0.03 % oxygen	15 ppb	0.002 % oxygen	1 ppb	0.5 ppmv O_2
Resolution	± 0.01 % O_2 at 0.21 % O_2 ± 0.1 % O_2 at 20.9 % O_2 ± 0.1 hPa at 2 hPa ± 1 hPa at 207 hPa	± 0.004 mg/L at 0.091 mg/L ± 0.045 mg/L at 9.1 mg/L ± 0.14 µmol/L at 2.83 µmol/L ± 1.4 µmol/L at 283.1 µmol/L	± 0.0007 % O_2 at 0.002 % O_2 ± 0.0015 % O_2 at 0.2 % O_2 ± 0.007 hPa at 0.023 hPa ± 0.015 hPa at 2.0 hPa	± 0.0003 mg/L at 0.001 mg/L ± 0.0006 mg/L at 0.09 mg/L ± 0.010 µmol/L at 0.03 µmol/L ± 0.020 µmol/L at 2.8 µmol/L	10 ± 0.5 ppmv O_2 100 ± 0.8 ppmv O_2 200 ± 1.5 ppmv O_2
Accuracy*	± 0.4 % O_2 at 20.9 % O_2 ± 0.05 % O_2 at 0.2 % O_2		± 1 ppb or ± 3 % of the respective concentration whichever is higher		± 2 ppmv O_2 or ± 5 % whichever is higher
Measurement temperature range	From 0 °C to + 50 °C		From 0 °C to + 50 °C		From 0 °C to + 40 °C
Response time (t_{90})	< 6 sec.	< 40 sec.	< 6 sec.	< 40 sec.	< 3 sec.
Properties					
Compatibility	Aqueous solutions, ethanol, methanol				Gas phase only
No cross-sensitivity	pH 1 – 14, CO_2, H_2S, SO_2, Ionic species				CO_2, SO_2
Cross-sensitivity	Organic solvents, such as acetone, toluene, chloroform or methylene chloride, chlorine gas				Organic vapor, chlorine gas
Sterilization procedures	Steam sterilization*, ethylene oxide (EtO), gamma-irradiation				-
Cleaning procedures	Cleaning in place (CIP, 2 % NaOH, + 80 °C, + 176 °F)*, 3 % H_2O_2, acidic agents (HCl, H_2SO_4) max. 4 – 5 %				-
Calibration	Two-point calibration in oxygen-free environment (nitrogen, sodium sulfite) and air-saturated environment		Two-point calibration in oxygen-free environment (nitrogen) and a second calibration value optimally between 1 and 2 % oxygen		Two-point calibration in oxygen-free environment (nitrogen 6.0) and a second calibration value optimally between 100 and 200 ppm gaseous oxygen
Storage stability	5 years provided the sensor material is stored at room temperature in dry conditions and in the dark				

*after two-point calibration as described in the manual
**not for SP-PStx-NAU and SP-PStx-SA

For Microx 4 & OXY-1/-4 ST Series

	Sensor Type PSt7		Sensor Type PSt8	
Specifications	**Gaseous & Dissolved O_2**	**Dissolved O_2**	**Gaseous & Dissolved O_2**	**Dissolved O_2**
Measurement range	0 - 100 % O_2 0 - 1000 hPa	0 - 45 mg/L 0 - 1400 µmol/L	0 - 10 % O_2 0 - 100 hPa	0 - 4.5 mg/L 0 - 140 µmol/L
Limit of detection	0.02 % O_2	10 ppb	0.005 % O_2	2 ppb
Resolution	± 0.01 % O_2 at 1 % O_2 ± 0.05 % O_2 at 20.9 % O_2	± 0.005 mg/L at 0.4 mg/L ± 0.025 mg/L at 9.0 mg/L	± 0.002 % O_2 at 0.008 % O_2 ± 0.06 % O_2 at 2.5 % O_2	± 0.7 ppb at 3 ppb ± 2.5 ppb at 1000 ppb
Accuracy*	± 0.05 % O_2 or < 3 % rel.		± 3 ppb or < 3 % rel.	
Measurement temperature range	From 0 °C to + 50 °C		From 0 °C to + 50 °C	
Response time (t_{90})	< 3 sec.	< 10 sec.	< 3 sec.	< 10 sec.

*after two-point calibration as described in the manual

OEM Solutions for You

PreSens offers customized sensor technology solutions. Right from the beginning PreSens can be your partner while finding new approaches: from specifications to implementation up to production of your tool.

Don't hesitate to ask for your individual solution:
engineering@presens.de

IMAGING

VisiSens™ O_2 Imaging System

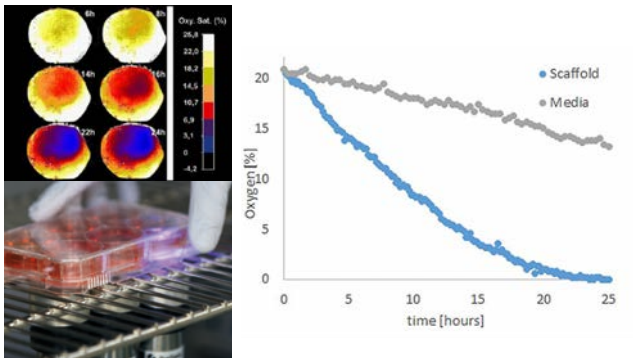
Record Spatial and Temporal O_2 Distributions

Fluorescent chemical optical sensor foils combined with VisiSens™ imaging technology allow for non-invasive mapping O_2 distributions in heterogeneous samples. The fluorescent sensor foil is attached directly on the sample surface or in a transparent vessel made of glass or plastic. The sensor foil is available in different sizes and can easily be cut in any desired shape. It translates the O_2 content into a light signal. The 2D sensor response is recorded contactless with the VisiSens™ imaging device in spatial and temporal manner.

- 2D read-out
- Contactless, direct sensing or through transparent walls
- Visualize spatial and temporal gradients
- Numerous measurement points in one image

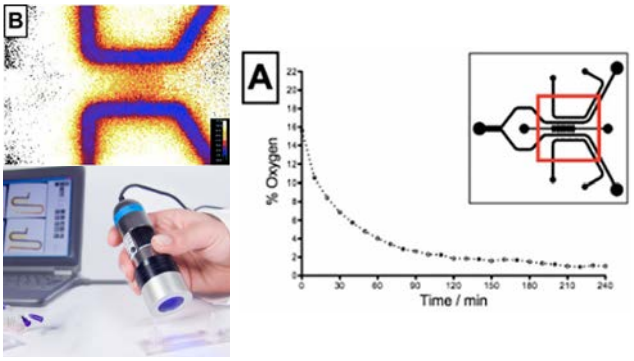
Is your application missing? Contact us and we find your customized solution!

Examples for Applications



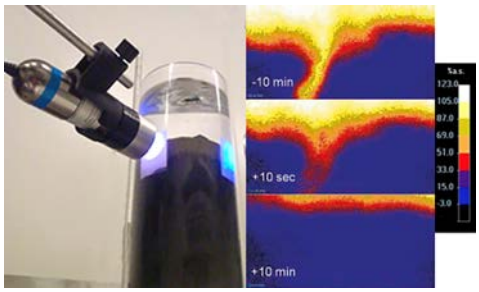
O_2 in Cell Culture and Engineered Tissue

Cellular metabolism critically depends on local O_2 supply. Especially in 2D and 3D cell culture or engineered tissue, cells located in diffusion limited regions (e.g. in scaffolds or spheroids) can be subject to low oxygen levels and pH changes. Non-invasive, continuous 2D-mapping can be performed directly in the incubator under growth conditions. Furthermore, 2D analyte distributions in living samples can be visualized.



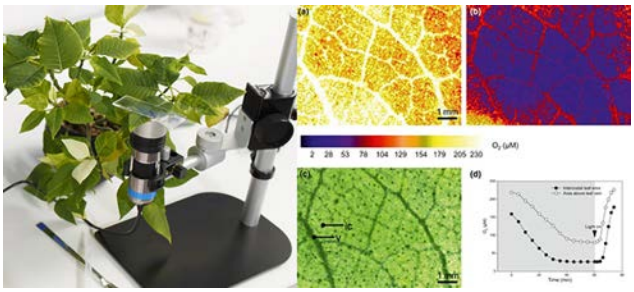
Non-invasive 2D O_2 Mapping in Microfluidics

VisiSens™ enables 2D visualization of important culture parameters inside microfluidic chips. You can continuously monitor in 2D, with high resolution at specific positions or over the whole chip surface in a non-contact read-out mode. Detect metabolic hotspots, record time-series, and monitor hypoxia, cellular growth, or O_2 supply inside the chip. You can gain new insights on metabolic activity and natural or artificially produced gradients.



O_2 Mapping in Sediments

O_2 is a key factor for microbial activity, various geochemical and living processes in sediments. Its supply highly varies locally, e. g. at interfaces, different depths or benthic disturbances. Spatial and temporal O_2 dynamics over long time periods can be visualized. Various regions can be compared within one measurement. VisiSens™ enables non-invasive 2D-mapping over cross-sections or on sample surfaces. The portable device can be used in lab and field.



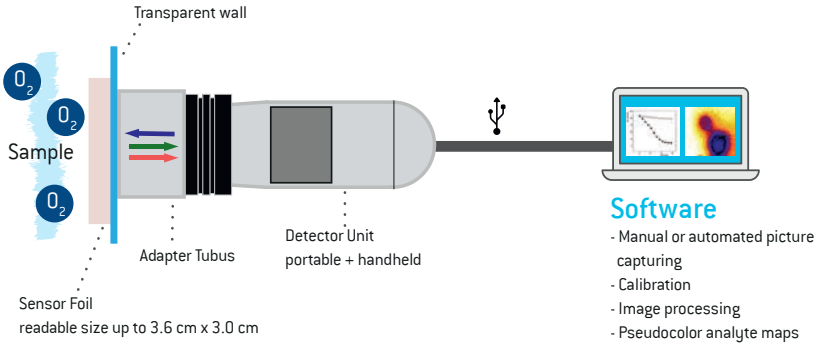
Visualized O_2 Respiration in Leaves

Plants are both producers and consumers of oxygen. Visualizing O_2 levels on the surface of plant leaves can give information about oxygen changes during light/dark conditions. The sensor foils attached to the leaf surface seal it against oxygen from ambient air and translate the respective analyte level with high spatial resolution. With VisiSens™ it is even possible to investigate different petal or vascular structures and compare them in terms of oxygen consumption.

SPECS

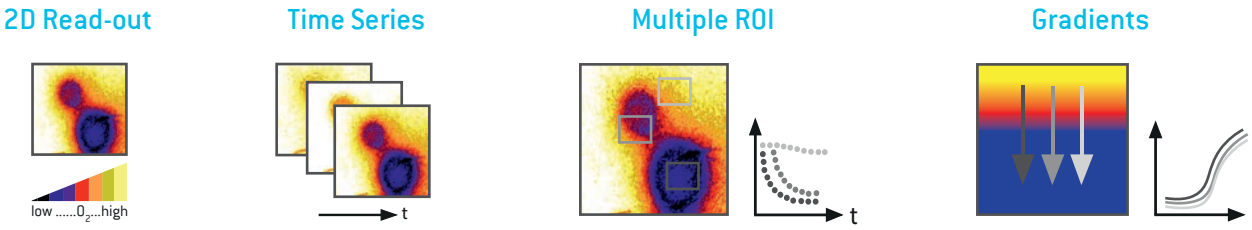
O_2	0 -100 % a.s. (0 - 20.9 % O_2)

SET-UP



Software
- Manual or automated picture capturing
- Calibration
- Image processing
- Pseudocolor analyte maps
- Time-lapse
- Free choice of ROI

EXEMPLARY RESULTS



VisiSens™ Detector Unit DU01

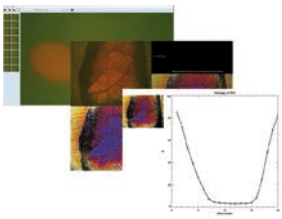
The detector unit DU01 is a spectral 2D detection device for O_2 imaging. It is designed for read-out of fluorescent optical sensor foils. The device is portable and connected via USB 2.0 to a PC / notebook for measurement. For fields of view from microscopic to 3.6 x 3.0 cm^2.

VisiSens™ TD

The VisiSens TD Basic System is a modular 2D read-out unit for O_2, pH and CO_2 sensor foils, even simultaneously in one experiment. The field of view ranges from 4 x 3 cm^2 to 8 x 6 cm^2 or up to 20 x 30 cm^2 with Big Area Kit.

O_2 Sensor Foil SF-RPSu4

The O_2 sensor foil can be attached to any sample surface or the inner surface of any transparent vessel. O_2 is measured contact-less in gaseous and liquid phase. SF-RPSu4 sensor foils have a measuring range of 0 – 100 % air saturation (0 – 20.9 % O_2).



VisiSens™ AnalytiCal 1

Software for recording and evaluation of data obtained by the VisiSens™ O_2 imaging set-up.

Is your application missing? Contact us and we find your customized solution!

Specifications

	VisiSens™ Detector Unit DU01 SF-RPSu4	
Specifications*	**Gaseous Oxygen**	**Dissolved Oxygen**
Measurement range	0 - 100 % air saturation (0 - 20.9 % O_2)	
Response time (t_{90})**	< 8 sec.	< 30 sec.
Size of sensor foil**	40 x 40 mm^2 to 100 x 150 mm^2	
Number of sensing points within one image**	300,000	
Measurement temperature range	From + 5 °C to + 45 °C	
Properties		
Compatibility	Aqueous solutions, ethanol (max. 70 % V/V), methanol (max. 10 % V/V), pH 2 - 10	
Device		
Camera chip	Enhanced Color CMOS	
Image resolution	1.3 megapixel (1280 x 1024 pixels)	
Magnification	10-fold up to 220-fold, depending on adapter tubus used	
Field of view	~ 2.3 x 2.0 mm^2 to ~ 4.1 x 3.3 cm^2; typically ~ 1.5 x 1.2 cm^2	
Output	15 fps live video preview (no storage) and 0.5 fps full-resolution picture storage (.png)	
Number of LEDs	8	
Dimensions	Length 10 cm, diameter 3.8 cm	
Digital interface	USB 2.0, high speed USB transmission	

*VisiSens™ is no approved medical device

**typical data which may strongly differ with adapting the imaging set-up to specific needs

	VisiSens™ TD SF-RPSu4	
Specifications*	**Gaseous Oxygen**	**Dissolved Oxygen**
Measurement range	0 - 100 % air saturation (0 - 20.9 % O_2)	
Response time (t_{90})**	< 8 sec.	< 30 sec.
Size of sensor foil**	40 x 40 mm^2 to 150 x 100 mm^2	
Limit of detection***	0.03 % air saturation	
Precision (temporal)****	± 0.02 % air saturation at 0 % air saturation± 0.1 % air saturation at 100 % air saturation	
Precision (spatial)*****	± 1.5 % air saturation at 0 % air saturation ± 3 % air saturation at 100 % air saturation	
General sensor temperature working range	from + 5 °C to + 45 °C	
Properties		
Compatibility	Aqueous solutions, ethanol (max. 70 % V/V), methanol (max. 10 % V/V), pH 2 - 10	
Device		
Camera chip	CCD Progressive with 12 bit ADC	
Image resolution	1.3 megapixel (1292 x 964 pixels)	
Field of view	~ 4 x 3 cm^2 to ~ 8 x 6 cm^2; up to 30 x 20 cm^2 with Big Area Imaging	
Output	up to 15 fps live video preview (no storage) and 0.5 fps full-resolution picture storage (.png)	
Digital interface	Ethernet with power injection (via AC adapter)	

* Prototype component. Please contact our service team!

** Typical data which may strongly differ with adapting the imaging set-up to specific needs

*** Typical data of LOD of a defined ROI (> 6,000 pixles) over time in dark lab conditions at + 20 °C, FoV 8 cm x 6 cm

**** Typical data of accuracy in a defined ROI (> 6,000 pixles) over time in dark lab conditions at + 20 °C, FoV 8 cm x 6 cm

***** Typical data of spatial standard deviation in defined ROI (> 6,000 pixels) in dark lab conditions at + 20 °C, FoV 8 cm x 6 cm

ACCES-
SORIES

Accessories for Optical O_2 Sensors & Meters

Extensions and Add-ons for Oxygen Measurements

We offer numerous accessories for our measurement devices. They extend the application possibilities of PreSens measurement systems. Optical sensor adapters allow our sensors to be used in a wide variety of containers.

- Optical adapters for connecting sensors to the meters
- Polymer optical fibers in different variations and lengths

Is your application missing? Contact us and we find your customized solution!

Specifications

	POF	POF-MH	Handheld USB-QR Barcode Scanner
Specifications			
Dimensions	Optical diameter is 2 mm; outer diameter including the black cladding is approx. 2.8 mm	Optical diameter is 2 mm; outer diameter including metal spiral hose is approx. 6 mm	7.8 cm x 7.5 cm x 14.1 cm
Weight	-	-	150 g
Connector type / Interface	SMA connectors on one or both sides available for use with stick-on adapter and adapter for round containers	SMA connector	USB
Length of fiber	Available lengths for the POF are 1.0 m, 2.5 m and 5.0 m (for lengths of more than 5 m, please contact our service team)	Available standard lengths 2.5 and 5.0 m (for lengths of more than 5 m, please contact our service team)	-
Compatibility	All devices with SMA connectors: Oxy-4 mini, Oxy-4 trace, Oxy-10 mini, Oxy-10 trace, Fibox 3, Fibox 3 trace, Fibox 3 LCD trace, Fibox 4, Fibox 4 trace, EOM-02-mini and EOM-t02-mini		Can be used for all devices compatible with: PreSens Measurement Studio 2 PreSens Device Configurator EOM-STS Pro
Details	Temperature stability: The POF is resistant to temperatures up to + 70 °C		Scan pattern: 2D area image (640 x 48 pixel array)

	Adapter for Round Containers (ARC)	Stick-On Adapter (SOA)	Vial Adapter for 20 mL Sensor Vials (VA)
Specifications			
Dimensions (D x W x H)	Velcro© strip 1000.0 mm x 22.0 mm x 4.0 mm	20.0 mm x 20.0 mm x 7.0 mm 12.0 mm total height w/ SMA socket	Ø 41.0 mm x 11.0 mm, inner Ø 28.5 mm
Connector type	SMA socket	SMA socket	slotted-head plastic screw
Compatibility	All devices with SMA connectors, e. g. Fibox 4, OXY-10 mini, and others		20 mL SensorVial-PSt3 together with all oxygen meters with SMA connectors, e. g. Fibox 4, OXY-10 mini, and others

Polymer Optical Fiber POF

For all our meters with SMA sockets, a polymer optical fiber is needed as a light guide between the device and the sensor. We offer different standard lengths, e.g. 2.5 m, and fibers with SMA connectors on one or both sides.

Adapter for Round Containers ARC

The adapter for round containers ARC is an adjustable Velcro®-type adapter. It can be used for round containers with diameters of 2.5 to 20 cm (1 to 8 inches). The SMA socket on this adapter must be connected to the polymer optical fiber (POF).

Stick-on Adapter SOA

The stick-on adapter SOA is used to attach the polymer optical fiber (POF) to a planar transparent glass or plastic container. It is equipped with an SMA socket, which must be connected to the POF.

Vial Adapter for 20 mL SensorVials VA

Adapter for attaching a polymer optical fiber to a 20 mL SensorVial

Handheld USB-QR Barcode Scanner

Connect this scanner and a PreSens measurement device to the PC and software, and calibrate your sensors by one fast barcode scan. The software transfers the new calibration data to the device.

Polymer Optical Fiber with Metal Spiral Hose Cover POF-MH

Polymer optical fiber for all meters with SMA sockets. Especially suited for sensor read-out in harsh environments or applications where solvents might get in touch with fiber. With the metal spiral hose cover accidental bending and damaging the fiber is avoided. Available in different lengths and can be connected to FTMs magnetically.

Product Range

Meters

O_2

Microx 4

Portable fiber optic oxygen meter for measurement in normal oxygen range with sensor spots, dipping probes or microsensors

Microx 4 trace

Oxygen meter for measurement with sensor spots, dipping probes or micro-sensors in normal and trace oxygen ranges

Fibox 4

Portable fiber optic oxygen meter for measurement in normal oxygen range

Fibox 4 trace

Fiber optic oxygen meter for measure-ment in normal, trace, and ultra-low oxygen ranges

OXY-1 SMA

Small, PC-controlled and USB-powered oxygen meter for measurements in normal oxygen range

OXY-1 SMA trace

USB-powered, benchtop oxygen meter for trace oxygen measurements

OXY-1 ST

Small, PC-controlled oxygen meter for use with microsensors, spots, dipping probes and flow-through cells

OXY-1 ST trace

Small trace oxygen meter for use with microsensors, spots, dipping probes and flow-through cells

Fibox 3 LCD trace

Fiber optic oxygen meter with LCD dis-play for measurement in normal, trace, and ultra-low oxygen ranges

OXY Flux

Optical oxygen amplifier for eddy covariance measurements, can directly be connected to Vector, delivers mea-surements at 10 Hz frequency and is waterproof

Is your application missing? Contact us and we find your customized solution!

OXY-4 SMA

Small, 4-channel oxygen meter with temperature compensation for each individual channel

OXY-4 SMA trace

Small, PC-controlled trace oxygen meter for measurements with up to 4 sensors

OXY-4 ST

USB-powered and PC-controlled 4-channel oxygen meter for use with microsensors, spots, dipping probes and flow-through cells

OXY-4 ST trace

Small, 4-channel trace oxygen meter for use with microsensors, spots, dipping probes and flow-through cells

OXY-1 WM

Wall mount oxygen meter for measurements in normal oxygen range

OXY-1 WM trace

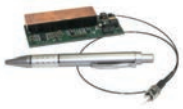
Wall mount oxygen meter for measurements in normal, trace and ultra-low oxygen ranges

EOM-O_2-mini

Precise OEM solution for oxygen measurements with sensor spots, FTCs and probes

EOM-tO_2-mini

OEM solution for measurement in normal and trace oxygen ranges



EOM-O_2-micro

OEM solution for high resolution oxygen measurements with microsensors

Sensors

O_2

O_2 Sensor Spots SP-PSt3/PSt6/PSt9

Versatile, small oxygen sensors for measurements in normal, trace, and ultra-low oxygen ranges (0 – 100 % O_2 / 0 – 45 mg/L, or 0 – 5 % O_2 / 0 – 2 mg/L, or 0 – 200 ppm); compatible with Fibox and OXY-mini/trace series

Self-adhesive O_2 Sensors SP-PSt3-SA

Easy to integrate into transparent vessels; for contactless measurement in normal oxygen range (0 – 100 % O_2 / 0 – 45 mg/L); compatible with Fibox and OXY-mini/trace series

O_2 Sensor Spots SP-PSt7/PSt8

Small, versatile oxygen sensors for measurements in normal and trace oxygen ranges (0 – 100 % O_2 / 0 – 45 mg/L or 0 – 10 % O_2 / 0 – 4.5 mg/L); compatible with Microx 4 & Microx 4 trace

O_2 SensorsPlug

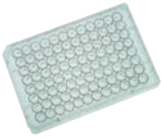
O_2 SensorPlug for milli- and microfluidic applications with appropiate chip and port design which allows online monitoring of O_2.

20 mL SensorVial SV-PSt3-20mL

Vial with sensor stripe for measurements in headspace and liquid or different depths (0 – 100 % O_2 / 0 – 45 mg/L); also autoclavable version available

Oxygen-sensitive Cap OSC-PSt3/PSt6

Transparent closure with oxygen sensor for oxygen ingress monitoring in PET bottles (0 – 100 % O_2 / 0 – 45 mg/L, or 0 – 5 % O_2 / 0 – 2 mg/L)



OxoPlate OP96C/OP96U

96-well microtiter plate (flat bottom or round bottom) with integrated oxygen sensor in each well; compatible with conventional fluorescence readers

Spinner Flask with Integrated O_2 & pH Sensors SPS-HP5-PSt3

Spinner flask with integrated sensors for contactless culture monitoring

O_2 Flow-through Cell FTC-PSt3

Oxygen monitoring in perfusion systems (0 – 45 mg/L, / 0 – 1400 µmol/L); different sizes for various flow rates available

O_2 Flow-through Cell FTC-SU-PSt3

Plastic FTC for oxygen monitoring (0 – 45 mg/L / 0 – 1400 µmol/L); can be delivered beta-irradiated or untreated

O_2 Flow-through Cell FTC-PSt7

Oxygen monitoring in perfusion systems (0 – 45 mg/L, / 0 – 1400 µmol/L) with Microx 4 or Microx 4 trace; different sizes for various flow rates available

O_2 Flow-through Cell FTC-SU-PSt7

Plastic FTC for oxygen monitoring with Microx 4 or Microx 4 trace (0 – 45 mg/L / 0 – 1400 µmol/L); can be delivered beta-irradiated or untreated

Autoclavable O_2 Flow-through Cell FTC-PSt3/PSt6-YAU

Monitoring in normal or trace oxygen range (0 – 45 mg/L / 0 – 1400 µmol/L, or 0 – 5 % O_2 / 0 – 2 mg/L) inside perfusion systems or bypasses

Oxygen Probe Integrated in Metal Flow-through Connector FTM-PSt3/PSt6/PSt9

Metal FTC with oxygen exchange window for in-line measurements in pipes, available for different measurement ranges and in different sizes, stand CIP & steam sterilization

Oxygen Exchange Window OEW-PSt3/PSt6/PSt9

Easy replacement of a used normal range, trace or ultra-low oxygen sensor (0 – 100 % O_2 / 0 – 45 mg/L, or 0 – 5 % O_2 / 0 – 2 mg/L, or 0 – 200 ppm) by just exchanging the OEW

Teflon® FTCT

Teflon® FTC with oxygen exchange window for in-line perfusion monitoring, solvent-resistant and compatible with TMAH, available in different sizes for wide range and trace oxygen monitoring

Sensors

O_2

OXYPro® MR(M)

Mid-range oxygen probe for direct connection to a control unit, measurement range 0 - 20.9 % O_2 / 0 - 9 mg/L

OXYPro® WR(M)

Wide range oxygen probe for direct connection to a control unit, measurement range 0 - 100 % O_2 / 0 - 45 mg/L

OXYPro® TR(M)

Trace range oxygen probe for direct connection to a control unit, measurement range 0 - 10 % O_2 / 0 - 4.2 mg/L

OXYPro® UTR(M)

Ultra-trace oxygen probe for direct connection to a control unit, measurement range 0 - 200 ppmv gaseous oxygen

O_2 Probe for In-line Measurements OIM-PSt3/PSt6/PSt9

Robust probe for production processes with excellent long-term stability (0 – 100 % O_2 / 0 – 45 mg/L, or 0 – 5 % O_2 / 0 – 2 mg/L, or 0 - 200 ppmv O_2)

Oxygen Exchange Cap OEC-PSt3/PSt6/PSt7/PSt8/PSt9

Replacement cap for OIM or OXYPro®, available with different coatings, e. g. safe for food applications

Oxygen Exchange Cap OEC30-PSt3/PSt6/PSt7/PSt8/PSt9

Replacement cap for OIM or OXYPro®, reducing air bubble formation, available with different coatings, e. g. hydrophobic Teflon coating

OXYBase® Series

Robust electro-optical module combined with a sensor in a stainless steel housing

O_2 Dipping Probe DP-PSt7/PSt8

Robust oxygen probe for measurements with the all-round devices Microx 4 & Microx 4 trace (0 – 100 % O_2, / 0 – 45 mg/L, or 0 – 10 % O_2 / 0 – 4.5 mg/L)

O_2 Dipping Probe DP-PSt3/PSt6/PSt9

Oxygen probe with steel fitting for normal range, trace, or ultra-low oxygen measurements (0 – 100 % O_2 / 0 – 45 mg/L, or 0 – 5 % O_2 / 0 – 2 mg/L, or 0 – 200 ppm)

Is your application missing? Contact us and we find your customized solution!

Needle-type Oxygen Microsenor NTH-PSt1

High resolution measurement in normal oxygen range with Microx TX3 (0 – 100 % O_2 / 0 – 45 mg/L)

Needle-type Oxygen Microsenor NTH-PSt7/PSt8

On-the-spot measurement of oxygen (0 – 100 % O_2 / 0 – 45 mg/L, or 0 – 10 % O_2 / 0 – 4.5 mg/L); compatible with Microx 4 or Microx 4 trace

Needle-type Oxygen Micro-sensor with Fixed Sensor Tip NFSG-PSt1

Ideal sensor for measuring oxygen inside packaging with Microx TX3 (0 – 100 % O_2 / 0 – 45 mg/L)

Needle-type Oxygen Microsen-sor with Fixed Sensor Tip NFSG-PSt7/PSt8

Measures inside packaging (0 – 100 % O_2 / 0 – 45 mg/L, or 0 – 10 % O_2 / 0 – 4.5 mg/L) with Microx 4 or Microx 4 trace oxygen meters

Implantable Oxygen Microsensor IMP-PSt1

Bare fiber microsensor for oxygen measurements in normal range (0 – 100 % O_2 / 0 – 45 mg/L); compatible with Microx TX3

Implantable Oxygen Microsensor IMP-PSt7/PSt8

Bare fiber microsensor for use with Microx 4 & Microx 4 trace (0 – 100 % O_2 / 0 – 45 mg/L, or 0 – 10 % O_2 / 0 – 4.5 mg/L)

Profiling Oxygen Microsensor PM-PSt1

Microsensor for microprofiling applications; compatible with Microx TX3 (0 – 100 % O_2 / 0 – 45 mg/L)

Profiling Oxygen Microsensor PM-PSt7/PSt8

Microsensor for oxygen microprofiling (0 – 100 % O_2 / 0 – 45 mg/L, or 0 – 10 % O_2 / 0 – 4.5 mg/L); compatible with Microx 4 & Microx 4 trace

Microprofiling Solutions

O_2

Manual Micromanipulator MM

Vibration-free, high-resolution control for pH microsensors and dipping probes

Manual Micromanipulator MM33

Vibration-free, high resolution control for oxygen microsensors

Automated Micromanipulator AM

Fully automated, high-resolution control for pH microsensors and dipping probes

Safe-Insert

This accessory can be attached to the Automated Micromanipulator for safe insertion of NTHs in semi-solid and hard substrates.

Heavy Stand

The Heavy Stand ensures save vertical mounting and operation of the Micro-manipulators.

Transport Case

High-quality travel case for one AM and one Heavy Stand

Is your application missing? Contact us and we find your customized solution!

Accessories

O_2

Polymer Optical Fiber POF

They serve as a versatile connection from meter to sensor.

Adapter for Round Containers ARC & Stick-On Adapter SOA

The ARC is used for round containers with a diameter of 2.5 to 20 cm (1 – 8 inches). The Stick-On Adapter (SOA) can be used for planar containers.

Polymer Optical Fiber with Metal Spiral Hose Cover POF-MH

Especially suited for sensor read-out in harsh environments

Vial Adapter for 20 mL SensorVials VA

Adapter for attaching a polymer optical fiber to a 20 mL SensorVial

Permeation Cell

Leak tight measurement cell to test the oxygen transmission rate of material films

Dipping Probe Weights DW

Stabilize the probe in underwater applications

Integration Set Sensor Spots IS-SP

Vacuum tweezers for easy integration of self-adhesive sensor spots

Coaster for Shake Flasks CFG

Read-out of sensors integrated at the flask bottom

Adapter for 25 mm Ports OAD-25

The OAD-25 is used to connect all OIMs to 25 mm ports.

OXYPro®-Varivent Adapter

Stainless steel adapter for in-line measurement with OXYPro®

OXYPro®-Triclamp Adapter

Stainless steel adapter for in-line measurement with OXYPro®

OXYPro®-FTM (Metal Flow-through Cell)

OXYPro®-FTM for in-line measurement in pipelines

OXYPro®-NPT

PVDF adapter with NPT 1/2 thread

Handheld USB-QR Barcode Scanner

Simply connected to PC & software via USB, allows easy sensor calibration via barcode scan

Discover the complete PreSens portfolio

Products

Optical Oxygen Sensors & Meters

Optical pH Sensors & Meters

Optical CO_2 Sensors & Meters

Optical Sensor Systems

VisiSens™ Imaging Systems

OEM Solutions & Engineering

Industries

Biology & Environmental

Industry & Technical

Biotech & Pharma

Medical & Life Sciences

Food & Beverage

Bring to light what's inside.

PreSens comes from PRECISION SENSING and offers:

- precise and simple measurement of O_2, pH, CO_2 and biomass
- systems for Pharma, Biotech, Food & Beverage, Biological & Environmental Research, Technical or Industrial Applications and Medical Devices
- sensors thinner than a hair, non-invasive and online
- optimum advice and support
- more than 1,000 items in stock
- prompt delivery worldwide

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